TELEPHONE ENGINEER

Volume XVII | CHICAGO, JANUARY, 1917 | Number 1

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CHICAGO

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If Your News Dealer Will Not Supply You—Please Notify Us

VOL. XVII CHICAGO, JANUARY, 1917 NO. 1

Ed Mock

THE death of Ed Mock, announcement of which appears on another page, will be a shock to a host of telephone men whose sincere friendship he had gained in his eight years' service as a publisher. It is futile to set down words that cannot hope to express the sense of loss and the more intimate personal grief of his near associates. The passing of our friends and fellow-workers is an experience that all must feel sooner or later, but the truth of that philosophy never softens the blow.

For several months before his death Mr. Mock was unable to attend to his interests, and his place in the affairs of this magazine had already been filled. For the work of a corporation must go on, regardless of human frailties. There will be no change in the Electricity Magazine Corporation other than the election by its board of directors of a new president; and in TELEPHONE ENGINEER, of course, there will be no change whatever.

Thanks largely to Mr. Mock's executive genius, the publishing house he established eight years ago has grown more substantial each year. Never one of the biggest, it is nevertheless one of the most solid institutions of its kind in the country, and many a publisher with properties that are superficially more pretentious might envy the splendid condition of the business that E. J. Mock built.

Like all conservative, constructive builders, Mr. Mock's progress as a trade paper publisher was slow but sure. Always located in the same building, the offices of this magazine have moved four times to secure a larger suite and accommodate a bigger staff of workers. His established trade paper policy of "Readers First" gradually increased its circulation until today it has many thousands of paid subscribers—and the other papers of the group he established are equally successful.

A policy so satisfactory, so successful in the broader meaning of the word, need not and will not be changed. It is the hope and expectation of the stockholders, directors and executives of TELEPHONE ENGINEER to build it to far greater heights upon the foundation so well laid by Ed Mock.

It is our keenest regret that Mr. Mock could not stay with us to see the further progress of the work he started. His labor was all for the future; and now that the future is here and TELEPHONE ENGINEER has gained recognition as the leader in its field, he is not present to take part in it.

For the increasing success and greater growth that we anticipate for TELEPHONE ENGINEER in 1917 and beyond, we hasten to pay full tribute to the deep, wide and solid foundation laid by that best of publishers and best of men, Ed Mock.

The Convention

CONVENTIONS are all alike, says the pessimist, who is generally but a superficial observer. There is really as much difference in conventions as there is in individuals, though it is often hard to define it. This last convention, which closed December 8, 1916, might be characterized as more business-like, less emotional, and perhaps even more inspiring than some of its predecessors. It radiated more self-confidence, more independence (the small i is correct), more optimism for the future.

Circumstances would justify these feelings, even if the convention had not manifested them so plainly. The future looks pretty bright for the aggressive type of Independent telephony. That does not mean, of course, that Independent telephony has entered upon an era of peace, or ever will, but that in its prospective battles it stands a good chance.

This slightly changed atmosphere of the last national Independent gathering bears out our constant conviction that Independent telephony will be improved by more aggression and less defense; by more confidence in itself; by more public and less private demonstrations.

As an association the U. S. I. T. A. showed considerable strength; but big as it is, it ought to be bigger. Every operator of an Independent telephone company should unquestionably be a member—voluntarily, and without the necessity of appeal.

No association is superhuman, and its work cannot be done without money. To accomplish anything it must have workers, who must live, and it must pay rents and postage and printing the same as any other business. Within reasonable limits, the more money is available under competent management, the more permanent good may be accomplished.

The association used last year about twenty-five thousand dollars—a really inconsiderable sum—most of which was contributed by manufacturers and dealers. While it is right that these should do their share, there is no reason why they should bear most of the burden.

There is no other use to which the Independent operators can put a few dollars a year—a few cents a week, if it looks better that way—that will return them anything like the profit association membership guarantees. Possibly it is the very insignificance of the contribution that is responsible for its neglect. If that is so, we hasten to advocate an appeal large enough to give at least an excuse for rejecting it.

Maybe if the association stated its requirements as a hundred thousand dollars a year, and operated on a corresponding scale, the operators would be sufficiently impressed to come across with their pro rata share of the fund. Then the association really could do something.

Michigan Stands for Physical Connection

MICHIGAN'S Supreme Court has given us one more physical connection decision by upholding a connection order of the state commission, from which the Bell company, after its custom, appealed. The text of the decision is given on another page. It is interesting because it introduces an interpretation which appears to have been neglected.

The function of the telephone corporation is service, not peculiarly to its subscribers, but generally to the public. The service obligation is not even confined to the public of the company's community, but includes the stranger within that community and the world outside.

It is quite evident that an Independent subscriber is entitled to the use of a Bell line, or vice versa, by the simple means of using a public pay station. While he is so engaged, he is a patron of both companies. An arrangement whereby he can accomplish the same end in the privacy of his home or office, without the necessity of renting two identical pieces of apparatus, is merely a public convenience and not a confiscation of property.

Opponents of physical connection claim that by its means the competing company is given control of its rival's lines. Whether the Independent subscriber uses a Bell line by way of a public pay station, or by way of a connection of his private telephone to the Bell lines, he is entitled to the full use of such lines and equipment as are necessary to his purposes.

This argument would have been regarded, a short time ago, as mere sophistry. That a state supreme court has recognized it and based a momentous opinion upon it is encouraging to the cause of ultimate public service.

A Bill to Diminish Trade Paper Reading

A DEFICIT in a branch of governmental public service so universally important as the Post Office Department has no real significance. The object of the post office is to serve the people, not to make money out of them. If there were stockholders in the enterprise who demanded dividends on pain of electing new directors, it would be a simple matter to increase letter postage fifty per cent. A three-cent rate instead of a two-cent on first class mail would pay a handsome profit; and it would not appreciably diminish business, because the majority of sealed mail must go whatever the cost. And as the post office has a monopoly of its business, the public would have to stand it.

But the post office is not a stock company. It is a mutual organization whose stockholders are the public. They get their dividends in cheaper postage and better service. The only point of similarity is that they do, most emphatically, elect the directors of the organization. Those directors work under the real necessity of delivering good service at a minimum cost, and under the urge of vanity and ambition to establish a record by showing a proper profit. It is easier, and more desirable for internal reasons, to increase revenue than to reduce expenses. The groping mind of the post office systematizer, seeking the branch of its activities where public resentment will be least, accepts eagerly the superficial evidence that the second class department is the logical victim.

But any meddling with second class rates must give immunity to the newspapers. The unfortunate fate of a former attempt to impose a level two-cent rate demonstrates that. Those who live in the public eye must retain the friendship of the newspaper press. A cleverly arranged zone system is the politically obvious answer. It throws the whole burden on the educational publications (which includes all trade papers); and, as everybody knows, they have little political influence and control few votes.

The rider to the regular post office bill, which the House Post Office Committee has reported favorably, establishes the following rates on second class matter: Under 300 miles, one cent; 300 to 600 miles, two cents; 600 to 1,000 miles, three cents; 1,000 to 1,400 miles, four cents; 1,400 to 1,800 miles, five cents; more than 1,800 miles, six cents. The average increase is one hundred and fifty per cent over present rates. Postmaster General Burleson himself advocates an increase of but thirty-three per cent, and recommended a postponement of the question pending investigation. Not the least remarkable feature of the situation is that Representative Randall, the author of the rider, is from California; and his constituents are in the six-cent zone, figuring from the only publishing centers in the country!

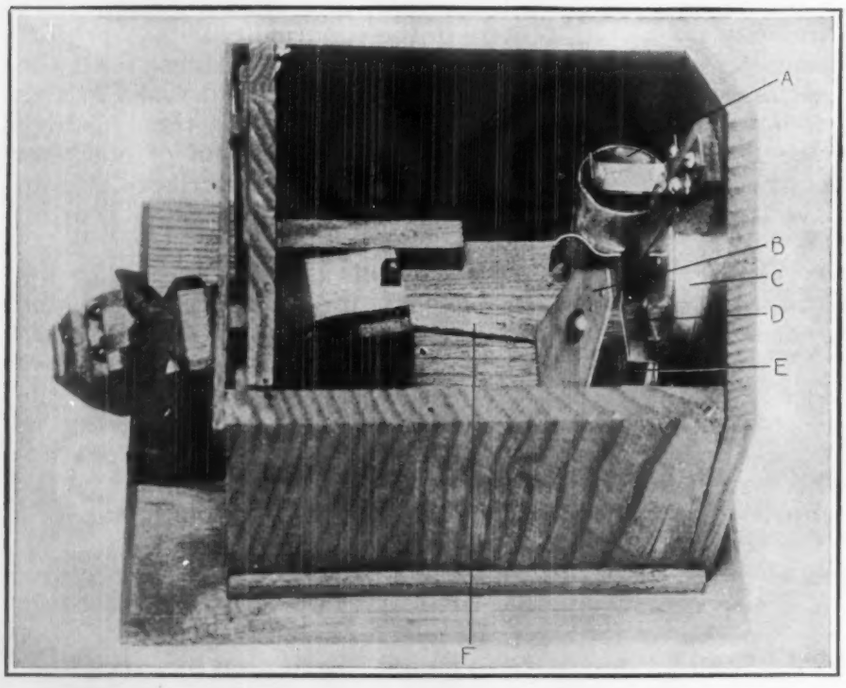
Postage is one of the big expense items of the trade paper publishing business. Of the thousands of trade papers which perform their monthly or weekly educational tasks in this country, we know of many in other industries whose net profit scarcely equals their postage bills. A one hundred and fifty per cent increase in postage would put them out of business. If the bill with its rider should pass, the weekly paper with ten thousand subscribers and an issue weighing one pound would have to pay an extra postage tax of over seven per cent on one hundred thousand dollars!

We can conceive of no greater calamity to the industries of this country than to be deprived of their trade papers. They represent the highest development of practical educational method; they are the agents of industrial and commercial efficiency, and the mediums of inspiration to ambitious workers. Not because we are trade paper publishers, but because we are where we can observe the readers of all three classes of periodicals—the newspaper, the popular magazine, and the trade paper—we unhesitatingly give first place in importance to the trade paper. There can be no question that it has done more than any other class of reading matter to build up the business supremacy of this nation. To place a prohibitive tax upon it is to strangle the industrial progress of America at a time when encouragement is most vital to its future welfare.

Even the post office never seems to grasp the truth that trade papers originate more first class mail—the profitable class—than any other kind of periodical. One page of advertising in one of our own publications a few weeks ago, for example, was responsible for nearly three thousand two-cent stamps. The total amount of first class mail set in motion by every issue of a trade paper exceeds the second class postage of the paper itself.

There are few more fertile sources of dispute than a telephone bill, for it is a fact that few people indeed keep track of their telephone calls. As a result, the number of telephone calls charged for by the telephone company each month is usually discredited and often paid under protest, although the figures do not lie since the telephone organization keeps accurate count of the calls of every subscriber to its service. Simple as it seems, it is a rather difficult matter to maintain an accurate count of telephone calls for any length of time; at least if the volume of telephone calls is considerable, such as in the average office. Practically nothing short of an automatic device can be depended upon for an accurate total at the end of any desired period. A simple solution of the problem is presented in the use of a simple counter, mounted in some convenient manner on the telephone instrument so that its dial faces the user, as shown in the accompanying illustration. In the instance of a telephone desk-instrument the push-button of the counter is in position to be depressed by the thumb of the right hand which grasps the stand, so that if the counting of the call is not automatic it is at least unavoidable.—Scientific American.

Some officers of the Alberta Government Telephones, who—as well as some TWO HUNDRED *other executives of the system—read* TELEPHONE ENGINEER *every month. Standing are A. W. Gibson, traffic superintendent, and R. B. Baxter, plant superintendent. Seated are G. H. Moore, commercial superintendent; W. R. Pearce, general superintendent, and A. M. Mitchell, auditor.*



The only peculiarity about the little toy dog shown in plain view just peeking out of his kennel is that he comes when he is called. A microphone is the secret behind his obedience. To prepare the toy it is necessary each time to push back the dog until the iron armature B comes in contact with the pole-piece of a solenoid, E, which holds the armature against the tendency of the flat spring to throw it forward. It will be noted that the spring also serves as a support for the armature. Now ordinarily the current from the battery A does not pass through the solenoid or electromagnet, for the circuit is open; but the pushing back of the armature causes the circuit to be closed through a contact strip D and a contact point mounted on the iron armature, thus energizing the solenoid which holds the armature in place. In the circuit is included a highly sensitive microphone, C, mounted on the back wall of the kennel so as to face towards the entrance. With the dog in place, he is alert and ready to respond to his master's command, which may be given by blowing a whistle, clapping the hands, or uttering some sharp word. The sound waves thus created travel through the air until they impinge on the diaphragm of the super-sensitive microphone, which in turn causes a variation in the circuit sufficient to weaken materially the magnetic flux of the solenoid and release the iron armature. The latter, thrown forward by virtue of its powerful spring support, pushes the dog out of the kennel.—Scientific American.

STORIES OF PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.

Ed J. Mock Is Dead

EDGAR JUDSON MOCK, president of the Electricity Magazine Corporation, publisher of TELEPHONE ENGINEER, *Electric Vehicles* and *Motography,* died Monday morning, December 18, after an illness of several months.

That simple announcement and the real regret of his friends is, we know, all that he would wish. We might go on to tell how kind and considerate he was to his associates and the many things he did to endear himself to them; we might try, inadequately, to describe the shock of his taking away. But all that seems unnecessary when we speak to those in this industry who knew him so well, if perhaps not so well as we did.

Because of his illness, Mr. Mock had taken no part in the affairs of this office for several months. An executive of rare ability, he so organized his interests that they did not need his attention; and his death will have no effect upon their operation. His successor and the executive and editorial staffs of TELEPHONE ENGINEER will continue his policies as he established them. Other than that his inspiring personality will be missing, there will be no change. That is as he desired and as he planned. Paul H. Woodruff, editor of these publications since their beginning, will continue in charge.

Edgar J. Mock was born March 26, 1870, at Fort Wayne, Indiana. In 1896 he was publisher of the Alma (Neb.) *Weekly Record,* which he gave up to start the Hastings (Neb.) *Daily Record,* which he published for two years. In 1898 he became superintendent of the Western Newspaper Union at Omaha, and there he married Miss Estelle R. Long. In 1902 he became business manager of Telephony Publishing Company, resigning five years later as secretary-treasurer. He bought *Sound Waves,* a telephone trade paper, and sold it later to the McGraw Publishing Company of New York. He then organized the Electricity Magazine Corporation and was its president and treasurer for eight years.

Mr. Mock's wife, a sister, and two brothers survive him. He was a member of the Illinois Athletic Club, Midlothian Country Club and Normal Park Lodge, 797, A. F. & A. M. Masonic funeral services were held Wednesday, December 20, from his home at 9345 Pleasant avenue, Chicago.

E. J. Mock, 1870-1916

Toledo's Strike

The Ohio State Telephone Company has been embarrassed by a strike in the Toledo plant for some time since November. The company stated:

"The telephone officials do not know of any way by which they could have avoided the strike, except by yielding to threats instead of investigating and acting with consideration and good faith. They have no knowledge of any arbitrary stand.

"They have neither denied or conceded the right of labor to organize; they have not discussed the subject. They have not asked the public to take away the strike and the picket.

"The appearances are the strike is sympathetic and against not an unjust telephone company but a telephone company not that it is a disgraceful corporation but a corporation."

Twenty-five Toledo business men asked Judge Killits of the federal court for better service, as the telephone lines to the extent of 4,000 were destroyed. A temporary order was issued to compel the company to repair lines and also to restrain any strikers from interference with the repair work. Only a few hours elapsed after handing down the order when 300 more lines were cut Friday, December 15.

Saturday linemen worked without interference repairing 18 outside breaks.

From time to time various men called to repair lines left for the strikers.

The peace conference on Wednesday, December 20, resulted in no agreement.

Christmas day ushered in the sixth week of the strike with pickets marching up and down in the slush and snow.

The city council tried to get its hand in the rumpus and stir up the franchise question and take upon itself the powers of the State Public Utilities Commission, which should have charge of the question. Its interference will not help the situation but only prolong and befuddle the issues.

The intervening petition will be heard on January 18 by Judge Killits.

Second Annual Banquet of the United States Independent Telephone Association at Hotel La Salle, Chicago, December 7, 1916. Over five hundred were present.

Independents Have Successful Convention

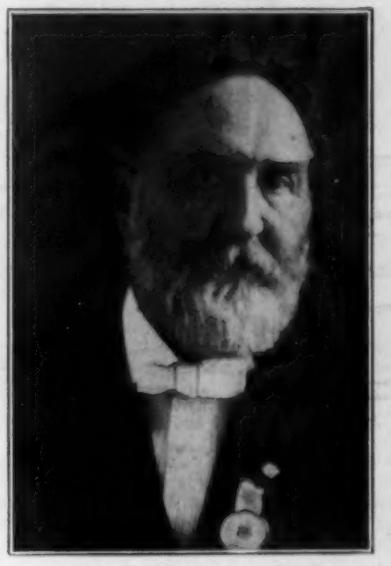
Second Annual Meeting of U. S. I. T. A. Full of Optimism

ALTHOUGH the United States Independent Telephone Association is only one year old, it sprang full panoplied from the organizations that preceded it, and at its second convention demonstrated that it is likely to exert more influence for good than has so far been enjoyed by the Independent telephone field.

As usual, Chicago's Hotel La Salle was the scene of the convention, which opened December 5 and closed December 8, 1916, one day more than is usually given the telephone meetings. Some two hundred visitors were present, all of whom paid close attention to both the sessions and the exhibits. That there might be no conflict between these two interests, the sessions were all held in the afternoon, during which time—after two o'clock—the exhibits were closed.

President Charles Y. McVey.

Secretary-Treasurer W. S. Vivian.



Chairman of the Board E. B. Fisher.

President Charles Y. McVey called the first session to order at 2:30 p. m. Tuesday, and Rev. Kirkwaldo Robbins delivered the invocation. William R. Moss of Chicago gave the welcoming address. In responding William Fortune, president of the Indianapolis Telephone Company, paid his respects to Chicago and emphasized the fact that the Independents have always been conducted by the people, for the people, and in conformity with the law; they, he said, are a democracy and their competitors an autocracy.

President McVey, in lieu of an extended presidential address, said a few words of praise for the directors, officers and committees of the association. He mentioned as problems for the future the question of federal and state control, government ownership, and the various anti-trust acts. He thought the association should impress its opposition to monopoly to the Newlands Committee and to the public press, and should insist upon a recognition of its members' right to use long-line connections in the public interest. The vital importance of the subject of Bell purchase of non-competing Independents was also dwelt upon.

It being E. B. Fisher's sixty-ninth birthday, the president then presented him with a bouquet of American beauty roses.

Mr. Fisher, as chairman of the board of directors, then delivered his address, which pleaded for still more earnest and aggressive effort for the coming year. He pointed out that competition had given Ohio, in eighteen years, fifty per cent more telephones than eighteen years of monopoly gave the entire country.

Vice-President F. B. MacKinnon's address, which is printed elsewhere in this issue, was made the subject of a motion to approve by Mr. Fortune, which was promptly seconded and carried.

Delwyn Stratton, from Wynona, Ohio, spoke upon "Applied Enthusiasm" with considerable personal application of that characteristic.

Secretary-Treasurer W. S. Vivian read the report of Vice-President MacKinnon, extracts from which follow:

During the past year the attention of the association's Washington office has been given to four lines of work.

First, Interstate Commerce Commission affairs, including accounting and reports.

Second, Department of Justice cases involving the purchase by the Bell company of Independent property.

Third, legislative matters affecting telephone interests.

Fourth, a toll connection with the American Telephone & Telegraph Company.

The attention of the accounting department of the Interstate Commerce Commission has been directed toward the publication of Accounting Bulletin No. 11, which contains answers to many questions applying to the detail of the Interstate accounting system.

In connection with the preparation of this bulletin, the association's accounting committee did much faithful work, holding a number of conferences with representatives of the commission. As a protest against some of the commission's rulings as regards accounting, arguments were filed in behalf

of the association explaining to the commission the necessity of changes in rulings in connection with a number of matters.

For the first time, A, B and C companies were called upon to make reports to the Interstate Commerce Commission. As a consequence your Washington office was required to handle a great deal of correspondence regarding these matters.

Through the efforts of the accounting committee the commission agreed to modify its order requiring monthly reports of Class B companies, substituting therefor a requirement that only those B class companies should be required to make monthly reports whose accounting system enabled them so to do.

In connection with the valuation division of the commission the association continued to supply the forms needed by member

Vice-President W. H. Bryant.

companies to comply with the commission's valuation order No. 18 and to give the member companies such information as was needed in the compilation of those reports.

On April 29, 1916, a hearing was held by the commission relative to the rules to be enforced in connection with Section 10 of the so-called Clayton act, an amendment to the anti-trust laws.

Your vice-president appeared in behalf of the association and pointed out to the commission that the rules required under this section of the Clayton act certainly should not be made to apply to the telephone companies regardless of the amount of purchases, which rule had been proposed by the commission. This matter is still under discussion, the date for the law going into effect having been postponed until April 15, 1917.

The association has been treated with the greatest courtesy by all representatives of the Interstate Commerce Commission and the appreciation of the association should be expressed to the evident desire on the part of the chiefs of divisions having to do with telephone matters to have those matters so handled by the commission as to best subserve the interest of the companies as well as of the public.

While the law is mandatory regarding the commission's prescribing a system of accounts and asking for certain reports, yet there has been no desire evidenced by anyone to take advantage of this fact to require unnecessary reports. If it is a mistake to require a report from every telephone company in the United States, the mistake is in the act of Congress and not on the part of the commission who are but the enforcers of the law.

During 1915 there was established a procedure by the Department of Justice whereby the attention of the association was called to all transactions submitted to the Department of Justice by the Bell company in which the Bell company proposed to purchase competitive Independents. Immediately upon receipt of the Bell company's statement, the department notifies the association's office and gives the association the opportunity to express its opinion in regard to the transaction.

Your vice president immediately upon receiving such notices from the Department of Justice, sends a copy of the same to each director, asking for his opinion in regard to the matter. In addition, such investigations are made as will enable the association to understand the situation under discussion and to express its opinion intelligently. During 1916 the Department of Justice has submitted the following matters to the association:

February 24: Farmer's Mutual Telephone Co., Bonesteel and Fairfax, S. D.
March 4: Bristol Telephone Co., Bristol, Tenn.
March 23: Florida Telephone Co., Chipley, Fla.
March 27: United Home Telephone Co., Muskegon, Mich.
March 30: Interstate Telephone & Telegraph Co., Aurora, Ill.
April 12: North State Telephone Co., High Point, N. C.
May 22: Chicago Automatic Telephone Co., Chicago, Ill.
July 3: Falls Church & Leesburg Telephone Co., Falls Church, Va.
July 21: Baiting Hollow & Roanoke Telephone Co., Riverhead, L. I., N. Y.
October 18: Decatur Home Telephone Co., Decatur, Ill.
October 18: Fayette County Telephone Co., Vandalia, Ill.
October 25: Grayson Telephone Co., Sherman, Texas.

Of these the Bristol Telephone Company's transaction involved the organization of a third company to take over the properties of the Bristol Telephone Company and the Bell company at Bristol, Tenn. This transaction did not involve the acquisition by the Bell company of a majority of the stock of the new organization. But in connection with this transaction, the association called the attention of the department to the fact that minority interests often controlled, and that therefore, in such transactions the amount of stock in the consolidated company allowed to be held by the Bell company should be negligible.

The transaction relating to the North State Telephone Company, of High Point, N. C., was not considered by the association because it was informed by the North State that no contract for the sale had been entered into between that company and the Bell company.

The transactions relative to the United Home Telephone Company, of Muskegon, Mich., and the Grayson Telephone Company, of Sherman, Texas, involved an arrangement for an exchange of properties between those companies and the Bell company, under which arrangements the Bell company would not increase its holdings in the territories affected. To these transactions the association made no objection.

Of the remaining transactions, those at Riverhead, Long Island, N. Y.; Falls Church, Va.; Chipley, Fla., and Fairfax, S. D., involved the purchase by the Bell company of non-competitive properties.

To the transaction relative to the Interstate Telephone & Telegraph Company, of Aurora, Ill., the association filed no objection because of the fact that the Bell company had already acquired possession and had been the owner for several years of the controlling interest in the Interstate company.

To the Chicago Automatic Telephone Company transaction and also to that of the Decatur Home Telephone Company, and

Vice-President G. W. Robinson.

the Fayette County Telephone Company, of Vandalia, Ill., the association filed its protest, these being in its opinion transactions violative of the agreement between the Department of Justice and the American Telephone & Telegraph Company, wherein that company stipulated that it would not purchase competitive properties.

The association upon request of member companies and

without notice from the Department of Justice, filed protest with that department against the acquisition by the Bell company of the Independent properties at Montevideo, Minn., and Osage, Iowa, both classed as non-competitive properties.

The association stands on record with the Department of Justice as being opposed to the purchase by the Bell company, not only of competitive properties but of non-competitive properties. The association stands on record with the Department of Justice as not being opposed to those exchanges of properties between the Bell and Independent companies that do not give to the Bell any more extended control of the telephone business in the territory in which the transfers are made.

During the past year the association was interested in two measures which were passed by Congress and in several others which failed of passage. Of the two measures which passed, one was the revenue bill, which was of interest to us in that it repealed the tax on toll messages and that it imposed a tax of 2 per cent annually on the net income of all telephone corporations. It also provided a special tax on the value of the capital stock in excess of $100,000.

The other measure, which was of vital importance to us, was Senate Joint Resolution No. 60, under which has been organized the so-called Newlands committee which is investigating the workings of the interstate commerce act and the value of commission control as compared with government ownership.

Your Washington office kept the members informed as to this legislation, relying upon each member to use his judgment as to what extent he should present his views to his representative in Congress. The association was able to be of service to all companies by notifying them in advance of the repeal of the tax on toll messages. A number of circular letters were sent to all members and the hearty co-operation of practically every member company was secured.

During the coming session the telephone companies will be confronted with legislation amending the interstate commerce act and proposals authorizing federal supervision of the issuance of all securities. Full information will be given member companies by the association in regard to the progress of these proposed measures.

At the time of the last convention of this association, the committee on toll line contract with the American Telephone & Telegraph Company, reported that an agreement had been reached under which a study was to be made of traffic conditions in different parts of the country, in the hope that this joint committee, representing the association and the Bell company would be able to work out a method of interchanging toll business that would be applicable to all competitive situations. Pursuant to this agreement an extensive investigation was made, all A class companies being visited or conferred with and the tentative plans as submitted by the association's representatives discussed with those companies.

These plans involved an arrangement between the Bell and Independent companies by which service would be given from competitive to non-competitive points only and by which use would be made of Independent toll lines in conjunction with Bell toll lines. Subsequently a series of conferences were held in New York City where traffic engineers representing the association and the Bell company discussed in detail the problems involved in putting into effect the proposed agreement.

Subsequently a report was prepared by the traffic engineers of this association for the committee's information, in which it was stated that the conclusion had been reached that the proposal of the association from a traffic standpoint was practical and could be put into effect without disturbing the traffic conditions of either company.

June 22, your toll committee met Vice-President Kingsbury of the American Telephone & Telegraph Company, to receive the answer of the company to the committee's proposal. Mr. Kingsbury stated his company had definitely concluded that it would offer no different contract to competitive companies than the so-called "Qualified Toll Contract" offered in 1914.

On June 26, your committee reported to the board of directors Mr. Kingsbury's statement and asked that it be discharged from further consideration of the matter.

A new committee has been formed with instructions to take such steps as may be necessary to obtain for members of this association and Independent telephone companies generally toll line connections with the American Telephone & Telegraph Company, using such means as may be necessary whether through existing laws or special legislation. This committee so instructed is to meet during this convention and prepare recommendations to the incoming board of directors.

Much of the time of the Washington office has been consumed in a study of the financial operations of our member companies. With our limited facilities we have obtained the information submitted to you elsewhere. This study has convinced your officers of the necessity of providing more liberally for such work at Washington so that at the next convention there may be submitted for your consideration a complete compilation regarding the financial operations of not only every member company but of every Independent company reporting to the Interstate Commerce Commission and a careful study of the operations of every company that it a part of the Bell system.

As secretary-treasurer, Mr. Vivian reported that 1916's pledges of $23,060 to the association had all been met except about $1,600. Up to the time of the meeting the membership committee had turned in 640 new members. The total membership represented 37 states as well as (by associate members) Canada and England. The association had been represented at twelve state conventions and more than a hundred conferences. Seven board meetings averaged twenty-three directors in attendance and, with three executive committee meetings gave the association officers a mileage total of 102,864 miles. In eleven months 23,000 pieces of mail were sent out, of which 16,000 were first class.

The books on long distance operating rules prepared by the traffic committee were announced as ready for delivery. The secretary attended ten operator's schools, addressing a total of 1,400 operators. The service department gave out information requested in several hundred letters. The association represented, said Mr. Vivian, $200,000,000 of investment and should have larger and more active moral and financial support.

The outside plant committee's report was presented by L. E. Hurtz, general manager of the Lincoln Telephone and Telegraph Company. The committee, in conference with the United States Bureau of Standards, was able to get modifications of the bureau's rules permitting the use of No. 12 steel wire on railroad crossings in rural districts under certain conditions, and the use of 2¾ by 3¾ inch arms in eight and ten pin sizes with conductors not larger than No. 10, in rural districts with dry climates.

President McVey announced the following convention committees:

Resolutions—F. B. MacKinnon, chairman, Washington, D. C.; G. W. Robinson, St. Paul, Minn.; Theodore Gary, Kansas City, Mo.; E. D. Schade, Johnstown, Pa.; and S. M. Heller, Louisville, Ky.

Nominating—H. Linton Reber, chairman, St. Louis, Mo.; A. F. Adams, Kansas City, Mo.; Geo. W. Fuller, Rochester, N. Y.; W. F. Goodrich, La Crosse, Wis.; and F. L. Beam, Mt. Vernon, Ohio.

Judges of Election—E. C. Blomeyer, Waco, Texas; F. V. Newman, Grand Papids, Mich.; and F. E. Bohn, Ft. Wayne, Ind.

Banquet Tickets—H. O. Leinard, Cleveland, Ohio; M. F. Hosea, Indianapolis, Ind.; W. W. Johnson, Jefferson City, Mo.; H. B. McMeal, Chicago; F. L. Eldridge, Chicago; F. J. Heavens, Pittsburgh, Pa.; F. H. Runkel, Portage, Wis.; C. B. Randall, St. Paul, Minn.; Roy Owens, Columbus, Ohio; H. L. Harris, Rochester, N. Y.; and Paul Woodruff, Chicago.

Sergeant-at-Arms—A. B. Clarke, Kansas City, Mo.; J. B. Edwards, Chicago; Roy McCanne, Rochester, N. Y.; Walter Trimm, Ft. Dodge, Iowa; W. F. Benoist, Chicago; W. J. Melchers, Owosso, Mich.; and H. C. Todd, Maryville, Mo.

Press—Rollo R. Stevens, chairman, Columbus, Ohio; H. B. McMeal, Chicago; Paul Woodruff, Chicago; A. C. Brokaw, St. Paul, Minn.; and A. Smith, Ft. Worth, Texas.

F. V. Newman, as chairman of the traffic committee, exhibited a copy of the new operating rule book (which is described on another page) and explained its importance and usefulness. The work of the committee, he said, had but just begun.

A general discussion followed on the subject of Interstate Commerce Commission control over intrastate companies. W. H. Morrison, Ashtabula, Ohio, questioned the justice of such control, mentioning the

cost to local companies, and advocated a test case. D. J. Cable also thought the association should take action in the matter, as did C. J. Garlow, Columbus, Neb., and Mr. Cable presented a resolution to the effect that the Interstate Commerce Commission be requested to exclude intra-state telephone companies from its definition of interstate carriers until adjudication of the question by the courts, which was referred to the resolution committee.

A previously formed society of state association officers met Wednesday morning, December 6, and discussed co-operation and the exchange of bulletins, etc. As officers were elected C. J. Garlow, Nebraska, president; E. C. Blomeyer, Texas, vice-president; C. C. Deering, Iowa, secretary-treasurer; Terry W. Allen, Tennessee, and T. L. Youmans, Kansas, executive committeemen.

Wednesday afternoon President McVey opened the meeting by calling for the nominating committee report, which H. Linton Reber presented. Two additional nominations from the floor closed the list. W. H. Bryant, Alabama, took the chair and L. E. Hurtz discussed "Interference with Telephone Service by High Power Electric Transmission Lines." Mr. Hurtz declared that adequate separation was the only remedy for interference troubles.

Harold L. Beyer, Grinnell, Iowa, presented "Legal Phases of Transmission Line Interference," a subject upon which he is an authority. These papers will be printed later.

C. J. Canada, of the United States Bureau of Standards, spoke on the National Electrical Safety Code as affecting telephone practice, and Mr. Hurtz rose to recommend that telephone men spend forty cents for circular No. 54 of the Code.

The traffic conference held Thursday morning, F. V. Newman in the chair, discussed "The Value of Peg Counts," "Lost Toll Calls," "The Two-Ticket and Single Ticket Methods of Handling Toll Calls," and the value of operator schools.

Thursday afternoon President McVey introduced Judge N. G. Hunter, Wabash, Ind.—an old Independent, whose utterances are always eagerly received.

E. C. Blomeyer, Texas, reported on the election of directors, which was:

THREE YEAR TERM.

A. F. Adams, Kansas City, Mo.; F. L. Beam, Mt. Vernon, Ohio; J. B. Earle, Waco, Tex.; E B. Fisher, Grand Rapids, Mich.; G. R. Fuller, Rochester, N. Y.; W. F. Goodrich, La Crosse, Wis.; S. G. McMeen, Columbus, Ohio; C. Y. McVey, Cleveland, Ohio; H. Linton Reber, St. Louis, Mo.; G. W. Robinson, St. Paul, Minn.; E. D. Schrade, Johnstown, Pa.

TWO YEAR TERM.

W. H. Bryant, Mobile, Ala.; P. C. Burns, Chicago; J. C. Casler, Dallas, Tex.; H. D. Critchfield, Chicago; J. B. Edwards, Chicago; H. L. Gary, Kansas City, Mo.; S. M. Heller, Louisville, Ky.; W. Roy McCanne, Rochester, N. Y.; C. E. Tarte, Grand Rapids, Mich.; Hart F. Farwell, Terre Haute, Ind.

ONE YEAR TERM

Terry W. Allen, Jackson, Tenn.; H. L. Beyer, Grinnell, Iowa; E. D. Glandon, Pittsfield, Ill.; F. B. MacKinnon, Washington, D. C.; D. S. Parker, Panoma, Cal.; Albert Parlett, Bristol, Tenn.-Va.; W. J. Uhl, Logansport, Ind.; W. S. Vivian, Chicago; F. H. Woods, Lincoln, Neb.; W H. Trimm, Ft. Dodge, Iowa.

C. A. Bennett, Missouri, presided during the reading of "Modern Accounting," by Prof. Arthur A. Anderson; "Costs of Service," by George C. Matthews, Chicago; "Getting the Business," Rollo R. Stevens, Ohio; "The New Advertising," Roy D. Mock, Chicago; and "Getting the Business in an Exchange of Three Thousand," P. M. Ferguson, Mankato, Minn.

The banquet was held Thursday evening, December 7, with over five hundred guests. Manford Savage, Champaign, Ill., was toastmaster. Invocation was by Rev. Abel M. White, and the address of the evening by Rev. Rufus A. White. The Beulah Buck Quartet entertained, with the musical assistance of all the guests.

The board of directors elected December 7 met at the hotel at 10 a. m. Friday to organize and plan the work of the association for the ensuing year. There were present:

A. F. Adams, Kansas City, Mo.; F. L. Beam, Mt. Vernon, Ohio; J. B. Earle, Waco, Texas, E. B. Fisher, Grand Rapids, Mich.; G. R. Fuller, Rochester, N. Y.; W. F. Goodrich, La-Crosse, Wis.; C. Y. McVey, Cleveland, Ohio; G. W. Robinson, St. Paul, Minn.; E. D. Schade, Johnstown, Pa.; W. H. Bryant, Mobile, Ala.; H. D. Critchfield, Chicago, Ill.; J. B. Edwards, Chicago, Ill.; H. L. Gary, Kansas City, Mo; S. M. Heller, Louisville, Ky.; W. Roy McCanne, Rochester, N. Y.; Hart F. Farwell, Bloomington, Ill.; Terry W. Allen, Jackson, Tenn.; H. L. Beyer, Grinnell, Iowa; E. D. Glandon, Pittsfield, Ill.; F. B. MacKinnon, Washington, D. C.; Albert Parlett, Bristol, Tenn.-Va.; W. S. Vivian, Chicago, Ill.; F. H. Woods, Lincoln, Neb.; W. H. Trimm, Ft. Dodge, Ia.

The meeting was called to order by C. Y. McVey, and E. B. Fisher who had so capably filled the office of chairman of the board during 1916 was unanimously reelected to that office. After Mr. Fisher had again taken the chair and had expressed his appreciation of the confidence shown him, upon motion all the officers who served the association during 1916 were unanimously reelected as follows:

E. B. Fisher, Grand Rapids, Chairman of Board.
C. Y. McVey, Cleveland, President.
W. H. Bryant, Mobile, Vice President.
G. W. Robinson, St. Paul, Vice President.
F. B. MacKinnon, Washington, Vice President.
W. S. Vivian, Chicago, Secretary-Treasurer.

The influence of the great convention was evident in the attitude and actions of every member of the board. No inharmonious chords were struck; all seemed animated with the single purpose of so conducting the association's business that it would continue to be the greatest force in the upbuilding of Independent telephony; all gave evidence of feeling the responsibility that rests upon the board of directors of the association. Each seemed to appreciate the honor that had been conferred upon him when he was selected to be a member of that board.

Owing to the afternoon session of the convention the board recessed until 10:30 a. m. December 8. At this meeting there were present:

A. F. Adams, Kansas City, Mo.; F. L. Beam, Mt. Vernon, Ohio; J. B. Earle, Waco, Texas; E. B. Fisher, Grand Rapids, Mich; G. R. Fuller, Rochester, N. Y.; W. F. Goodrich, La-Crosse, Wis.; C. Y. McVey, Cleveland, Ohio; H. Linton Reber, St. Louis, Mo.; G. W. Robinson, St. Paul, Minn.; W. H. Bryant, Mobile, Ala; H. D. Critchfield, Chicago, Ill.; J. B. Edwards, Chicago, Ill.; H. L. Gary, Kansas City, Mo.; S. M. Heller, Louisville, Ky.; Hart F. Farwell, Bloomington, Ill.; Terry W. Allen, Jackson, Tenn.; H. L. Beyer, Grinnell, Ia.; F. B. MacKinnon, Washington, D. C.; Albert Parlett, Bristol, Tenn.-Va.; W. J. Uhl, Logansport, Ind.; W. S. Vivian, Chicago, Ill.; F. H. Woods, Lincoln, Neb.; W. H. Trimm, Ft. Dodge, Ia.

The morning was spent in serious discussion of the association's policy and of its present attitude toward the great questions that are now confronting the whole telephone industry. As a result of these discussions, a committee consisting of Messrs. Adams, Critchfield, and Beyer were appointed to put into concrete form and report at the afternoon session the association's policy as tentatively and informally agreed upon.

The committee after recessing for lunch reas-

sembled at 2:30. The committee appointed to draft the association's platform prescribed the following report which was unanimously adopted.

Resolved, That the Policy of the United States Independent Telephone Association is:—

First: To prevent the purchase of non-competing Independent telephone properties by the American Telephone & Telegraph Company, or by any of its subsidiary, associated or allied companies, or by any person or persons acting for them, or either of them, directly or indirectly; and to that end the officers of this Association are specifically directed to sustain all protests heretofore filed with the Department of Justice against such purchases.

Second: To compel the observance of the so-called Kingsbury Committal to the Department of Justice of December 19, 1913, together with the Federal anti-trust laws in accordance with their spirit and intent.

Third: To compel the extension of facilities for the transmission of interstate telephone messages to the end that all telephone systems and their patrons may obtain such facilities on equal terms.

Fourth: To fully co-operate with and support Independent telephone manufacturers and dealers in supplies in their efforts to prevent unfair competition on the part of the Western Electric Company.

Fifth: Be it resolved that the officers of this Association are hereby directed to bring to the attention of the Newlands Committee the fundamental differences between the railroad and telephone business for the purpose of impressing said committee with the necessity of considering the problems of these two businesses separately with the expectation that the railroad question will be settled first, thus giving our officers time to prepare and fully present all telephone questions to the Newlands Committee; and be it further resolved that it be the sense of this Board of Directors that there be no extension of Federal control, unless there is a corresponding reduction in state control and that this Association is inalterably opposed to government ownership or operation of telephone properties.

Be it Resolved, that the officers are hereby directed to cause to be prepared a suitable petition in accordance with the resolution passed by the convention of this Association on the 8th day of December, 1916, relating to the Kingsbury Committal of December 19, 1913, to the Department of Justice, and present said petition to the President and attorney-general of the United States.

Be it Further Resolved, that the officers are further directed to prepare a case for presentation to the Interstate Commerce Commission, in which case request shall be made for toll connections between a competing, Independent telephone exchange system and the lines of the American Telphone & Telegraph Company or a subsidiary thereof, and when said case is prepared, to submit the same to the Board of Directors, January 20, 1917. This case is to be filed with the Interstate Commerce Commission only in event the President and the attorney-general are unable to afford the relief sought in the petition to them above provided for.

After instructing the officers to proceed to publish at the earliest opportunity the proceedings of the convention just closed, President McVey announced the following Finance committee: H. L. Gary, Kansas City, chairman; G. R. Fuller, Rochester; G. W. Robinson, St. Paul, who are to prepare a budget and report to the full board at which time other association committees will be announced and the plans for the year's work more definitely formulated. Before adjourning the members of the board expressed themselves as enthusiastic over the outlook for Independent telephony; that the board starts out with the united backing of the association and that the association will have the best efforts of the board working in complete harmony.

Friday afternoon, December 8, the last session of the convention was held. Amid considerable discussion the following resolutions, presented by F. B. MacKinnon for the committee, were passed:

Whereas, section 1 of the amendment of section 7, approved June 18, 1910, of the act entitled "An Act to Regulate Commerce" and subsequent amendments purport to include and define only telephone . . . companies, "engaged in sending messages from one state, territory or district of the United States to any other state, territory or district in the United States" as common carriers within the meaning and purpose of the act, and further provides that the "provisions of this act shall not apply . . ." to the transmission of messages by telephone and telegraph or cable wholly within one state and not transmitted to or from a foreign country from or to any state or territory, as aforesaid, and

Whereas, the commission appointed and exercising the duties of regulation prescribed under said act has failed to discriminate in the matter of requiring reports, between telephone companies engaged in interstate commerce and those the business of which is confined to a single state and not contemplated within the definition of said act, and

Whereas, the making of these reports required by the commission other than those carrying long-distance messages, are burdensome, a duplication and requiring the services of specialists in their preparation without compensating results, and

Whereas, the public utilities commissions of the several states have been created and constituted for the purpose of regulating all intrastate carriers and commerce and to perform the same functions for local companies as is sought to be performed by the Interstate Commerce Commission for interstate carriers and commerce; now, therefore, be it

Resolved, that it is the sense of this convention that said commission be requested to revise and restrict its definition of interstate carriers so as to exclude all telephone companies other than those doing a long-distance interstate business, until such time as the courts of the United States have determined otherwise, and if necessary that the Congress of the United States be asked to so amend said act as to exclude telpehone companies other than those engaged in long-distance toll business from the provisions of said act.

Whereas, the American Telephone & Telegraph Company, in its letter of December 19, 1913, to the attorney-general did agree to cease its efforts to monopolize the telephone business of the United States; and among other things did also agree to promptly make arrangements under which the public using telephones not operated by the Bell system could secure toll service over its lines, and

Whereas, the attorney general, in his letter of the same date, acknowledging this commitment, expressed his understanding of the agreement in the following words: "Your frank negotiations in respect to these matters compel the belief that what you propose will be carried out in good faith; and it seems to me clear that such action on your part will establish conditions under which there will be full opportunity throughout the country for competition in the transmission of intelligence by wire," and

Whereas, the President in his letter, of the same date, to the attorney general expressed his understanding of the intent of the commitment in these words: "It is very gratifying that the company should thus volunteer to adjust its business to the conditions of competition," and

Whereas, the conditions under which the A. T. & T. Co. will permit the "Independent companies" to secure for their subscribers toll service over the lines are so onerous and discriminatory that they have proven prohibitive, although a committee composed of representatives of the A. T. & T. Co. and the United States Independent Telephone Association, after exhaustive study and visiting many of the larger cities of the country, found no equipment or traffic obstacles or difficulties which could not be readily overcome, and

Whereas, nearly three years have elapsed without obtaining arrangements under which all Independent companies could, with fairness and equity to their subscribers and themselves, secure toll service over the lines of the American company; now, therefore, be it

Resolved, that this, the United States Independent Telephone Association, in convention assembled in the city of Chicago, Ill., on this 8th day of December, 1916, and representing its members in 35 states of the Union and several million people using their service, do respectfully petition the President of the United States to take further notice of the aforesaid letter from the American Telephone & Telegraph Company, to the end that the intent of the commitment may be fulfilled rather than its provisos, and do respectfully appeal to the attorney general to take such action as will give full force and effect to the spirit of the said letter and require the American Telephone & Telegraph Company to provide all other telephone companies with toll service over its lines without discrimination and under the same terms as are made with any other company; and be it further

Resolved, that the secretary of this convention be and hereby is instructed to send a copy of this resolution to the President and to the attorney general.

Whereas, the United States Independent Telephone Association is interested in the proper valuation of telephone properties by federal, state and municipal authorities and believes that the

establishment of certain general principles as the bases of those valuations is necessary and desirable, now, therefore, be it

Resolved at this annual meeting of the members of the association that in the opinion of the association the basis of all valuations of telephone properties should be:

First: The actual cost of those properties where complete records exist showing such costs.

Second: In the absence of such records of cost, then the value should be based upon the cost of reproducing the properties based on average or trend prices.

Whereas, the Western Electric Company continues its unfair competitive practice of soliciting orders from and selling apparatus and equipment to Independent operating companies, while the manufacturers of Independent equipment have no opportunity to sell their product to the American Telephone & Telegraph Company and its subsidiary companies, and

Whereas, the American Telephone & Telegraph Company, an operating telephone company, is by virtue of its ownership of the Western Electric Company, itself, in fact, in the business of manufacturing and selling apparatus in the open market while refusing to buy apparatus and equipment in that same market; now, therefore, be it

Resolved, by the United States Independent Telephone Association assembled in convention in the city of Chicago, Ill., December 8, 1916, that such sales of apparatus by the American Telephone & Telegraph Company are unfair and contrary to public policy and that the American Telephone & Telegraph Company should be required to divest itself of its control of the Western Electric Company and purchase its needed equipment in the open market, or should be required to desist from manufacturing telephone apparatus through the Western Electric Company for general sale in the competitive market; and that copies of this resolution be filed with the Department of Justice and Federal Trade Commission.

Whereas, the United States Independent Telephone Association has declared its belief that it is contrary to public policy and the anti-trust laws of the nation for the American Telephone & Telegraph Company and its subsidiaries to acquire by purchase, or otherwise, Independent non-competitive telephone properties, now, therefore, be it

Resolved, that this association re-affirms its declaration and hereby instructs its board of directors to make use of every possible means to aid in the enforcement of existing laws looking to the prevention of such transactions. In the event existing laws are not sufficient to provide adequate protection to the public against any such attempts to monopolize the telephone business of the country, then the directors of this association are instructed to use every possible means to secure such legislation as will provide adequate protection.

Whereas, by action of its board of directors the United States Independent Telephone Association is on record with the Department of Justice as being in favor of the strict enforcement of all anti-trust laws as applied to the telephone industry; now, therefore, be it

Resolved, by this annual meeting of the members of the association that the association endorses and approves the action of its board of directors and instructs the board of directors that it is the desire of the association that the policy so expressed be adhered to during the ensuing year, and that every resource of the association be utilized in supporting the association's position and contention in these particular matters and in protecting the telephone industry and the public generally from the intolerable conditions that are sure to result if any attempts to monopolize the telephone business of the country be successful.

Whereas, the United States Independent Telephone Association, by resolution adopted December 8, 1916, has declared its belief that the Western Electric Company is guilty of unfair competitive practices through its relationship to the American Telephone & Telegraph Company, and because of such belief the association refuses to permit the said Western Electric Company to participate in and exhibit at the conventions of the association; now, therefore, be it

Resolved, that the association suggests to all Independent telephone associations the propriety and justice of similar refusals by those associations.

"The Rural Telephone in Europe and America," by Frank G. Odell, Omaha; "Character Analysis of Your Man by a Practical Method," by Dr. J. M. Fitzgerald, Chicago, and "The Desiccator and Its Uses," by S. Webb, Shanghai, China, concluded the program, and with a few words from President McVey the convention was ended.

Terminal Pole Line Inspection Report

TROUBLES of an intermittent and permanent nature develop at terminal poles either through natural causes or through careless construction or repair work on the part of employes. The following is a partial list of common troubles usually found at these poles:

Loose cable conductor connection.

Loose drop wire or bridle wire connection.

Fuses not properly held in place by their contact springs.

Poor connections between spring and fuse tip due to corrosion. (Very common with brass tip fuses.)

Broken wire in fuse.

Open fuses.

Line grounded, due to the carbons of each side of the line touching.

One side or both sides of the line grounded, due to the absence of carbon separators.

Carbons grounded due to lightning discharges.

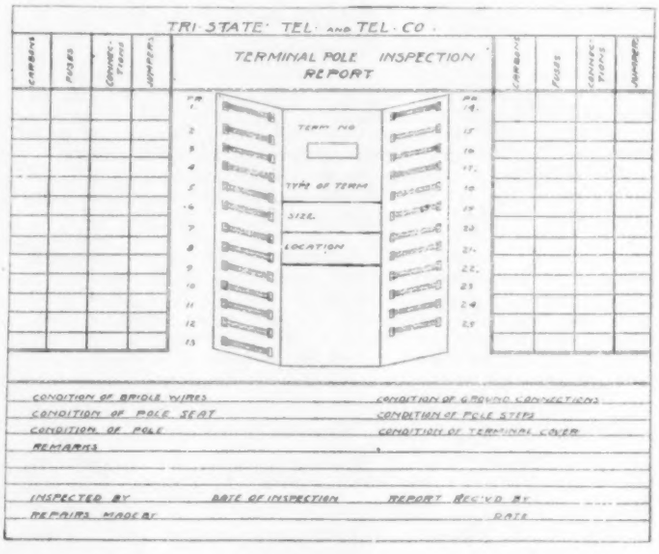
Open in bridle wires.

Short circuit in bridle wires due to abrasion of the insulation.

Moisture in terminal due to various causes.

Ground wire connection broken.

Hereafter all troublemen of the Tri-State Telephone Company, St. Paul, according to its house journal, *Our Emblem,* will be supplied with these report blanks, and during their spare time, while waiting for instructions or



This illustration shows in detail the many points covered by the new report.

materials for any work they may be out on, they will make complete inspection and report the condition of all terminal poles throughout the Twin Cities.

In addition to the inspection of the bridle wires, ground connection, pole seat and pole steps, the report calls for a detailed inspection of the terminal. If the carbons, fuses, soldering and jumper wires of the protectors of the 15 pair or 25 pair terminals, as the case may be, are found in good condition, it is indicated by a check mark in the squares corresponding to the various pairs of protectors.

Troubles in the terminals are recorded under "Remarks" and a report filled out by the inspector, after which it is submitted to the plant chief who will have the necessary repairs made.

The Telephone Transformer

An Outline of Transformer Applications in Telephone Practice

BY H. S. SHEPPARD

THE generic name, "Repeating Coil," given to the telephone transformer when it is used in cord circuits is misleading, especially, since in the last few years telephone repeaters or relays have come into use. This name often leads to the fallacy, common among operators, that throwing the repeating coil key in the so-called "convertible" cord circuits improves transmission because the coil "repeats" the message. In many cases transformers are kept in the circuit constantly through a misunderstanding as to their use, and the result is, of course, detrimental to the maintenance of a good standard of transmission.

The applications of the transformer in telephone practice are numerous, and the aim of this article is to outline some of the more common of these applications and to review in a very elementary way the electrical principles involved.

The transformer when used in local battery subscribers' sets is called an "induction coil." The primary is of low resistance and is wound on a bobbin next to the core, which is of the straight or "open" variety. The secondary has more turns and is wound over the primary, thus making a very simple and cheap construction. The coil should be designed so that the resistance and impedance of the primary are adapted to the transmitter used in the local circuit, while the resistance and impedance of the secondary should be adapted to the line constants. An open core is advantageous both because it greatly cheapens the construction and because it gives better results when the saturating direct current in the primary winding is considered. Fig. 1 is a simplified diagram of a local battery substation set illustrating the action of the induction coil. Diagram *"a"* shows the nature of the current in the transmitter circuit when a harmonic sound wave acts on the transmitter diaphram. This pulsating or acyclic current may be thought of as consisting of an alternating current superposed on a direct current. The induction coil "strains" out the direct current so that on the line side the current is a pure alternating one as shown in diagram *"b."* This action prevents direct current from flowing in the line circuit, with a consequent loss due to line resistance, and for this reason, as well as the "stepping-up" effect of the coil, transmission from a local battery sub-station set is usually inherently better than where a common battery is employed. In the common battery plant, however, average transmission is better because of better maintenance of plant.

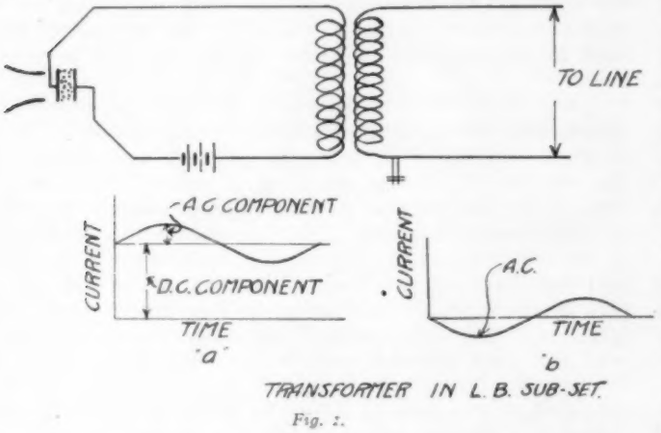


Fig. 1.

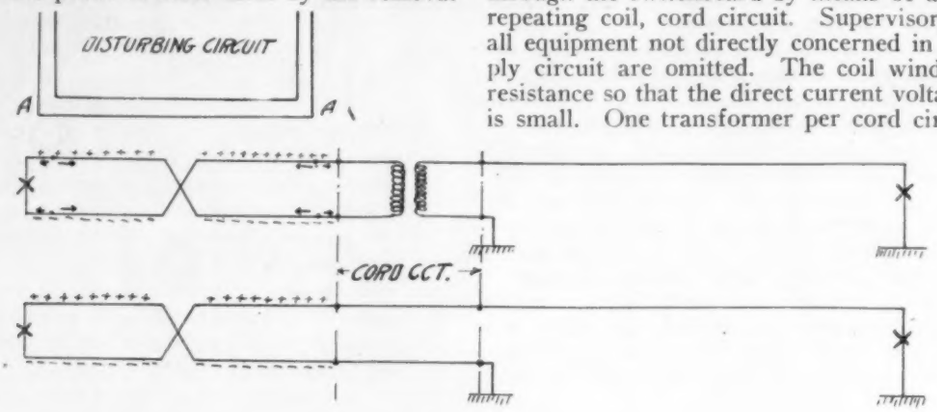
One-to-one ratio transformers are frequently used on magneto switchboards as "quieters." Part of the cord circuits are either permanently equipped with these "repeating coils" or the coil is wired to a key so that it can be thrown into the circuit at will. These last are called "convertible" cord circuits and often as many as half of the circuits on a position are so equipped. The function of the repeating coil as used here is primarily to prevent the unbalancing of a metallic circuit when it is connected through the switchboard to a grounded circuit. It is essential to the proper operation of superposed telegraph circuits that no grounded circuits be connected directly to the metallic circuits worked over. The repeating coil cord circuit may also be used to advantage in connecting two metallic circuits together when there is a ground on one of the circuits. The repeating coil does not prevent disturbances from passing from one line to the other but it permits the metallic circuit to be balanced effectively by transposition. Fig. 2 illustrates the action of the coil in quieting the metallic-grounded connection. In the circuit without the coil, the path to ground from one side of the metallic circuit is of higher resistance than is the path from the other side, so that the transposition shown at the middle of the circuit is not effective in reducing the disturbance from power circuit *AA*. In the circuit with the coil, the electrostatic charges will neutralize each other and the full benefit of the transposition will be derived. Looking at it in another way, everyone knows that a ground on a line makes a noisy circuit. In the case considered two grounds are removed from the metallic circuit by the repeating coil.

Local and toll connections are frequently put up on magneto boards using the same cord circuits for both. Because of this the transformers used in magneto cord circuits should be of the highest efficiency. The transmission loss caused by a poor transformer will, of course, be much more serious when it appears in a long distance connection than when local lines only are connected. Several well known manufacturers make a closed core coil which has a transmission loss of considerably less than half a mile of standard cable. Even with this small transmission loss the coils should never be in the circuit unless it is necessary. The amount of money which, theoretically, must be spent to replace a small transmission loss caused by a transformer or other apparatus unnecessarily in the circuit may be easily determined by computing the increase of copper required to make up the loss. In a connection over a long copper circuit this amount is large even for so small a loss as half a mile of standard cable.

In common battery toll boards a few of the cord circuits are frequently equipped so that the transformers, or repeating coils, which are necessary in toll local connections, are not removed from the circuit on through connections. They are intended to act as "quieters" on noisy lines. The main difficulty with this arrangement, from a transmission standpoint, is that the operators use their cord circuits indiscriminately, and the circuits with

permanent repeating coils are often used when it is not necessary. In this case they "quiet" transmission instead of induction.

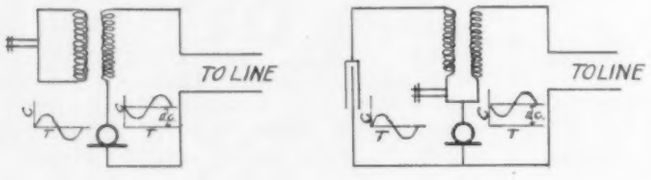
In general the use of transformers on local battery boards and on through connections in common battery boards is a relic of the old days of grounded lines. Transmission would profit in most cases by the removal of all but one, or possibly two where line conditions are bad, transformer cord circuits on each position.



TRANSFORMER IN MAGNETO CORD CIRCUIT
Fig. 2.

A transformer under the name of "induction coil" is used in most common battery sub-station sets where a receiver of the permanent magnet type is employed. Its purpose here is to prevent the flow of direct current through the windings of the receiver. In one type of sub-station circuit, that of the Western Electric Company, in addition to excluding battery current from the receiver the induction coil forms part of a net-work, the object of which is to reinforce transmission. Fig. 3 illustrates the two principal types of sub-station in which a transformer is required. The current diagrams in each branch of the circuit show the nature of the current in that branch when the transmitter is vibrating harmonically.

In common battery systems it is necessary to supply battery current from a common source at the central office to all subscribers' lines. Since the battery is common to all connections, the function of the battery supply circuit is to furnish current to the line through as low a resistance as possible and at the same time to prevent mutual interference or cross-talk between lines connected at any one time. The battery supply circuit should also be such as to prevent pulsations, due to the charging of the common battery, from reaching the subscribers' lines.



TRANSFORMER C.B. SUB-SETS
Fig. 3.

A transformer having divided primary and secondary windings fulfils all of these requirements admirably. One-to-one ratio coils having a closed iron core are used. The core should have sufficient area so that even with the maximum direct current flowing, the core will not be too highly saturated to respond to the weak alternating speech currents.

Fig. 4 shows this method of connecting two lines through the switchboard by means of a transformer, or repeating coil, cord circuit. Supervisory apparatus and all equipment not directly concerned in the battery supply circuit are omitted. The coil windings are of low resistance so that the direct current voltage drop in them is small. One transformer per cord circuit is used and the coils are mounted behind the switchboard or on a special rack in the terminal room. A heavy iron shell is used to prevent cross-talk due to flux leakage between coils.

Fig. 5 shows a transformer, of the type described above, with the winding divided into four sections. Two of these sections, *P-P*, form the primary and two, *S-S*, the secondary. Strictly speaking, of course, the designation of the windings as primary and secondary depends on which party is talking. Now numbering the terminals of the windings—*1, 2, 3, 4, 5, 6, 7, 8*—as shown, we will find that there are two ways of connecting the coils comprising the primary and secondary windings, both of which will give like results if the battery is not considered, but very different results if we consider cross-talk through the battery, and charging-noise. The coils are arranged on the core as shown in Fig. 5 for the sake of simplicity. In the actual coil, windings *7-8* and *5-6* would be reversed in their relative positions on the core.

First let us connect the primary and secondary so that the magneto-motive forces due to direct current in one winding will oppose those in the other. This is the condition shown in Fig. 5. The directions of the direct current magneto-motive forces which are trying to produce a flux in the core are shown for each section of the winding by heavy arrows. Now if the direct current in the primary is equal to that in the secondary these magneto-motive forces will be equal and opposite and will therefore neutralize each other so that the flux, which depends directly on resultant magneto-motive force, will be very small. This is on the assumption that the coil windings are balanced and that the flux leakage is small. Since the constant or direct current flux which the iron must carry is small, the core cross-section need not be large and the iron may be worked at a low point on the saturation curve. This is the "subtractive" d. c. flux connection. Practically, of course, the currents in the two windings would never be the same because of the differing resistances of subscribers' loops so that some flux would always be set up. We shall consider the case of balanced currents, however, because it simplifies matters.

Now let us consider what happens when the operation of the transmitter in the primary sets up a variation in the direct currents flowing. The variation of current in the primary induces similar variations in the secondary with a phase difference of about 180 degrees. This means that when the current in the primary is increasing in value that in the secondary is decreasing and vice versa. The nature of the currents in the two windings, the

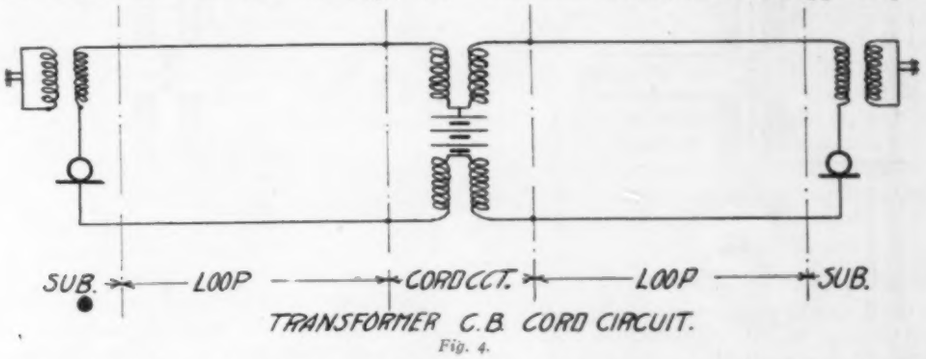


Fig. 4.

variation in transmitter resistance assumed to be harmonic, is shown by diagrams "*a*" and "*b*" in Fig. 5. The current in both cases consists of an alternating current superposed on a direct current. Since now the battery splits both halves of the transformer, what resultant variation will there be in the battery current? This is evidently of great importance for since the battery is common to all cord circuits, any variation in current through it, caused by a transmitter operating in one subscriber's loop, will result in cross-talk in all other loops connected. Suppose the primary current to be increased, due to a decrease in transmitter resistance, by a small increment as indicated by the arrow "*x*", then it is producing a magneto-motive force as shown by the arrow "*y*" which is endeavoring to build up a flux in the core. Now the magneto-motive force due to the current (or more correctly the e. m. f.) induced in the secondary must be in such a direction as to tend to prevent this increase of flux, or it will be directed as shown by the arrow "*z*". The secondary change of current must then be as indicated by "*w*". Current changes "*x*" and "*w*" are now seen to be both directed so as to cause the current through the battery to increase in value. Thus the variation of battery current is the cumulative result of the current variations in the primary and secondary. The same will be true if an oppositely directed increment of primary current is considered. The battery current may be represented as in diagram "*c*," which shows this current as the sum of both the direct and alternating currents in the two windings. If the common battery has appreciable resistance, then this varying current through it in the "subtractive" flux connection will result in a maximum amount of cross-talk.

Now let us reverse both of the secondary windings so that the connection is as shown in Fig. 6. The arrow "*x*" represents a change of current as before, and "*y*" is the resultant change in magneto-motive force for one winding. The secondary m.m.f. represented by "*z*" opposes "*y*" as before, but the induced current change "*w*" which produces "*z*" is now directed through the battery in the opposite direction, so that "*x*" and "*w*" instead of adding now neutralize each other. The diagrams "*a*," "*b*" and "*c*" show the nature of the primary, secondary, and battery currents for this connection.

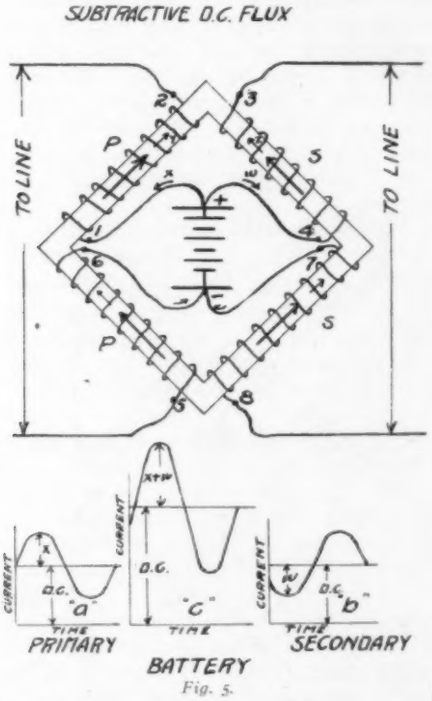


Fig. 5.

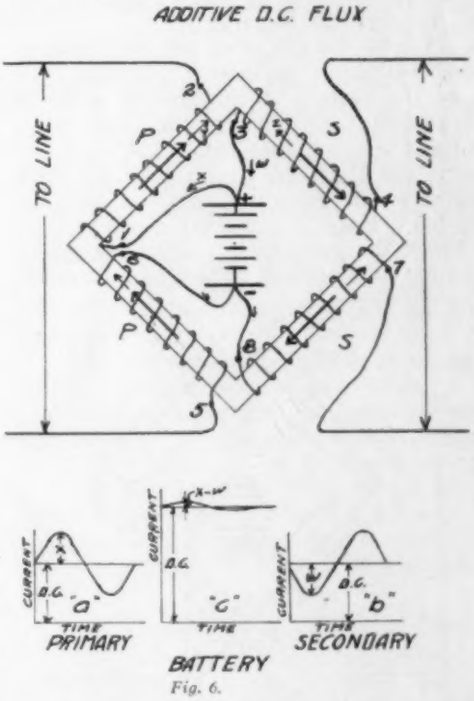


Fig. 6.

Diagram "*c*" shows that the battery current here is the sum of the direct and the difference of the alternating currents in the two loops. As indicated by heavy arrows the direct current magneto-motive forces and fluxes are now cumulative and we have an "additive" d.c. flux condition requiring large core cross-section if the saturation is to be kept down to a reasonable value.

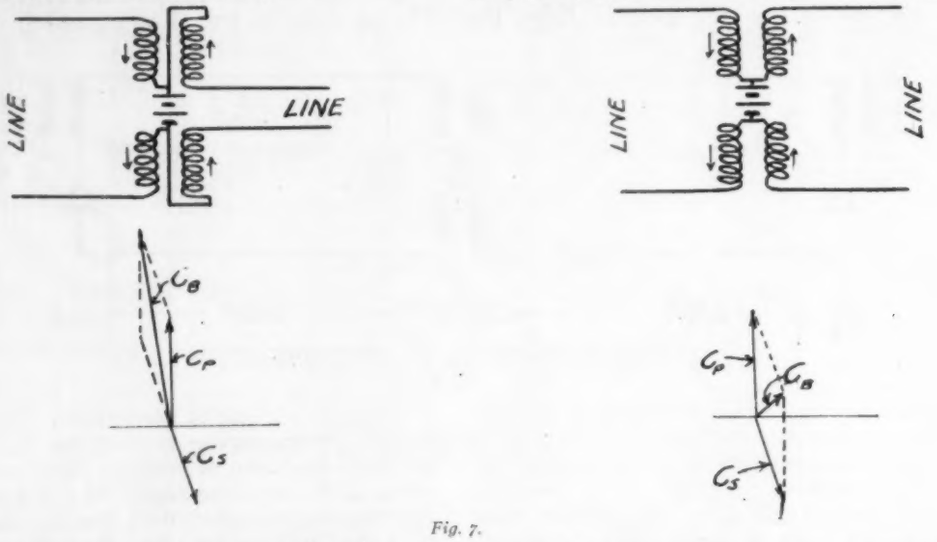


Fig. 7.

Fig. *7* shows the two connections in a different way. The arrows show the relative directions of the induced and inducing currents in the coils and through the battery. The vector diagrams indicate for each case the primary and secondary currents C_p and C_s and the resultant current C_b through the battery.

Let us next consider the effect of the two connections in preventing variations in battery potential, due to the charging of the battery, from causing noise in subscribers' instruments. Ordinarily the battery is charged while current is being supplied to the cord circuits. The battery and the cord circuit load are then connected in parallel to the generator terminals and the current to subscribers' loops is supplied directly from the generator. Since the generator current is never smooth, on account of commutator ripples and sparking, the effect, as far as the subscriber is concerned, will be that of an alternating current generator of commutation frequency connected in series with the common battery. This is represented in Fig. 8. The e.m.f. produced by the alternator *A* may be considered to be very small as compared with the e.m.f. of the battery. In practice the generator is connected to the battery through a heavy retardation coil and this, together with the fact that a low resistance battery forms an excellent shunt for the generator ripples, reduces the voltage variation during charging. Referring to the diagram on the left, if the current through the battery is increased, due to the series alternator, the increment of current in the primary causes a magneto-motive force which tends to create a counter-clockwise flux, while the current in the secondary tends to produce a clockwise flux. If then the alternating currents in the two circuits are equal the magneto-motive forces will neutralize each other, there will be no change of flux in the core with change of current, and the coil windings will therefore be non-inductive from the center outward. The coil then interposes a small impedance, due to its resistance only, to variations of current in the subscriber's loops. With this connection, battery charging is likely to be a noisy procedure unless the battery resistance is very low.

In the cumulative flux connection, on the other hand, a tendency on the part of the assumed series alternating current generator to increase the current through the battery results in the production of a counter-clockwise magneto-motive force in both the primary and secondary coils. The resulting flux is due to the sum of these two m.m.f.s and the coils are, consequently, highly inductive from the center outward, thus interposing a large impedance to the variation of current in the subscribers'

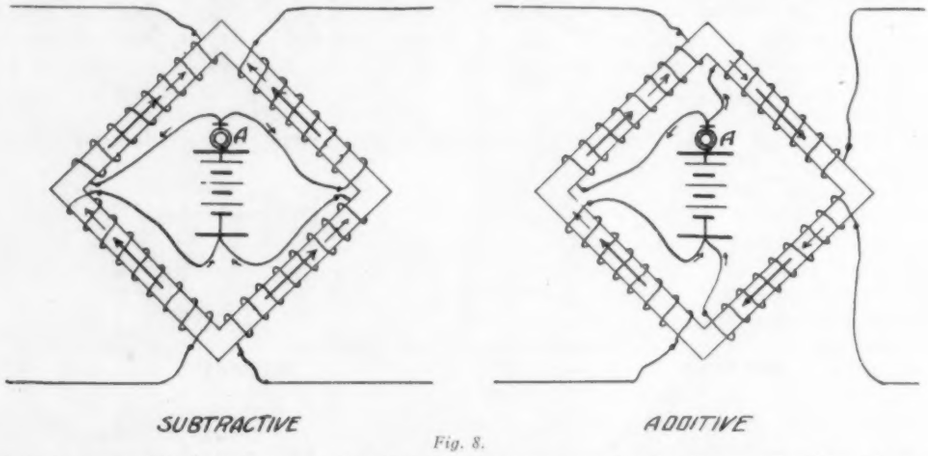


Fig. 8.

loops, when the source of varying potential is in the battery circuit. The flux and current relations referred to in this and the previous case can easily be checked out by the reader with the aid of the "thumb and fingers" rule. The "cumulative" connection, as demonstrated here, minimizes battery charging noise.

To summarize for the transformer as used in common battery cord circuits, the subtractive flux connection requires a comparatively small core, on account of the small direct current flux, and is consequently cheaper, but with a battery of appreciable resistance the cross-talk and battery-charging noise are large. The cumulative flux connection requires a large core to take care of the large constant flux and therefore requires a more expensive construction. This is overbalanced, however, by the fact that the battery resistance need not be so low, hence a cheaper battery, and by the reduction of cross-transmission and of battery-charging noise to negligible values. The transformers manufactured in this country are practically all connected for additive flux. In Europe the subtractive connection is more often preferred.

Transformers are of great value in producing superimposed telephone and telegraph circuits. In a phantom circuit, coils are placed at both ends of the line, the middle points of the secondary being tapped to derive a neutral point for the phantom leg. Two circuits so tapped

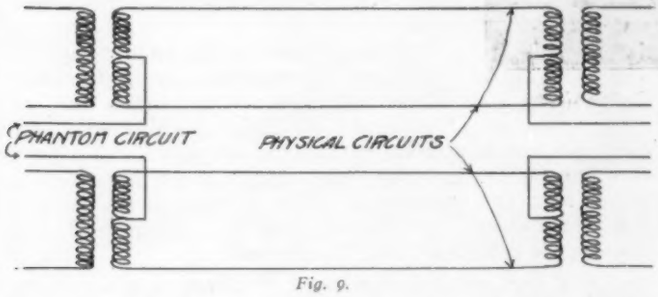


Fig. 9.

comprise a phantom circuit, as is shown in Fig. 9. The transformers used should be of high efficiency so that the side circuits may not be greatly impaired from a transmission and signaling standpoint. A simplex morse circuit is simply a tapped circuit worked grounded for telegraph purposes. Transformers used in phantom and simplex circuits must be accurately balanced, that is, one side of the winding should have the same resistance and inductance as the other side. If this is not the case then there will be no end of trouble due to cross-talk and morse "thump."

If circuits of different line impedances, such as a cable pair and an open wire line are to be connected, a transformer having an unequal ratio may be used to "step" the impedance of the cable up to that of the line. This reduces the transmission loss which occurs whenever two circuits of unequal impedance are joined together.

The telephone transformer is made in many forms and goes under many names, and while it may not be as imposing as its big brother, the power transformer, it is of great importance and is an indispensable adjunct to good telephone service.

American Association of Engineers Forming Student Club

The extension of the student membership of the American Association of Engineers is becoming more and more obvious as shown by the states of the movement at several State universities.

At the University of Illinois a temporary organization has already been formed under the name of the Illinois Engineering Club of the American Association of Engineers with the following officers: D. R. Norris, chairman; Y. A. Pecchia, secretary, and H. E. Fisher, treasurer. This club will hold a smoker as soon as examinations are over for the purpose of completing the chapter organization. Professors F. H. Newell and Ira O. Baker and Instructor J. A. DeTurk are faculty members.

At Purdue and Valparaiso chapters are in formation. The pioneers in at those schools are Professor C. Francis Harding and Dean R. C. Yeoman respectively.

All departments of the association in the national headquarters, 29 South La Salle street, Chicago, are growing rapidly, especially the membership department at the average rate of more than one hundred per month. At the present time there is a great demand for good structural engineers.

Nebraska Convention This Month

The annual convention of the Nebraska Independent Telephone Association will be held at the Lincoln Hotel, Lincoln, Nebraska, Wednesday, Thursday and Friday, January 10, 11 and 12, 1917. The program will be interesting and will cover all the important developments of the telephone business.

There are about 300 telephone companies in Nebraska, operating 500 exchanges, owned by 22,000 stockholders, operating about 200,000 telephones and representing an investment of more than $27,000,000. The telephone business is one of the greatest industries in the state; it furnishes an indispensable service, represents a large investment and more than two-thirds of these telephones are owned by Nebraska people.

A large attendance is expected this year on account of the prosperity of the state, and an interesting and instructive program has been prepared.

A large number of manufacturers and jobbers will be represented at the convention and present their usual exhibits of modern telephone equipment.

Small companies are especially urged to send representatives to this convention. The only expense connected with the association meeting is a registration fee of $1.00 for each company.

This convention will be held while the state legislature is in session, which will add an interesting feature to the program.

The Nebraska Association is operated for the good of the telephone industry as a whole; it has no paid employes, consequently incurs no expense other than postage and convention expenses. The dues are nominal, small companies $1.00 per year, companies owning from 500 to 1,000 telephones $5.00 per year, those owning more than 1,000 telephones $10.00 per year.

Lincoln has ample hotel facilities and can furnish rooms to convention visitors at any price desired.

Telephones on the Isle of Madagascar

The mileage of the urban telephone lines in Tananarive, Tamatave, Diego-Suarez, and Majunga on December 31, 1915, was 107 and that of the interurban line through the island 1,024, as compared with 101 and 1,023, respectively, in 1914. The gross telephone revenue of 1915 was $7,929, against $5,350 in 1914. At Tananarive the telephone subscription per phone is $46.32 per year, and for desk and other supplementary phones, $15.44. At Tamatave, Majunga, and Diego-Suarez the rates are $34.74 for the main phones and $11.58 for supplementary phones.

Our Association, Its Powers and Responsibilities

Vice-Presidential Address Before the Second Annual Convention of the U. S. I. T. A.

BY F. B. MACKINNON

Vice-President F. B. MacKinnon.

ALL the great public service corporations of the country are being studied by the government authorities.

A congressional committee for several weeks has been meeting in Washington to consider the needs of the common carriers and to ascertain what the exact needs of those carriers are to enable them to meet public demands. Preparatory to this investigation the railroad companies began a careful and painstaking study of themselves — their strength, their weaknesses. The railroad managers realize the nation is on the eve of great economic changes—changes in administrative methods, changes in the control of the great forces of interstate commerce, radical changes in financial methods.

The telephone companies are among the common carriers being investigated. The telephone companies are among those servants of the public for which changes in regulation methods are being discussed—for whom radical changes may be in store.

Within the next month, this association will be expected to explain to the Newlands committee its view of the telephone industry—the relation of Independent to Bell companies—the relation of the association to the Independent companies—the changes in existing laws desired by the association—the association's attitude toward government ownership. The association has made certain statements to the Department of Justice that must be supported by legal briefs, affidavits, and authoriative, verified information.

Is it not fitting, therefore, that the telephone companies at this time should study themselves? Is it not necessary that the United States Independent Telephone Association should study itself—its relation to the telephone industry, its relation to the public? Should not the members of the association consider what course the association shall pursue in doing its part in working out the economic problems of today?

I feel justified at this time in presenting to you the association's position in the telephone industry and the problems that are pressing for solution. By this statement it is hoped every member will be convinced of the importance of the part the association is being called upon to take in national affairs—of the responsibility that rests on every member as the result of the association's position.

In the United States, today, there are in round numbers 20,500 telephone exchanges in operation. These exchanges are operated by two great groups of companies. One group consists of those companies owned or controlled by the Bell company; the other consists of those companies, the controlling interest of which lies in hands independent of the Bell.

The Bell group operates 6,000 exchanges. The Independents operate 14,500 exchanges. Of these Independent exchanges, 12,700 are non-competitive, 600 are competitive with other Independents and 1,200 are competing with Bell companies.

In the Bell group, the American Telephone & Telegraph Company is the dominant factor. In the Independent group, the United States Independent Telephone Association dominates.

The control of the Bell group by the A. T. & T. Co. is because of its actual ownership of the majority interest in all the group companies. The control of the Independent group by the United States Independent Telephone Association is by virtue of the fact that the members of the group have voluntarily given the association control.

The purpose of the two groups of telephone companies are identical. These purposes are to protect the investments of their stockholders and give efficient telephone service to the public. To protect the investment, efficient service must be given—so, in fact, the purpose of all companies is to protect the stockholders' investment, and to see that he has a reasonable return on that investment.

The Bell group consists of 37 Class A companies, 50 Class B companies and 68 Class C and D companies—a total of 155 separate organizations.

The Bell group's strength lies in its cohesive and comprehensive organization, formed primarily for the purpose of financing its member companies and, secondarily, to provide an organization for rendering like service in all parts of the country. Its strength lies in its possession of a nation-wide system of toll lines and its ownership of the large terminals of those toll lines. Its weakness lies in its size, in its impersonal touch, its restrictive red tape, its desire to do big things and the ignoring of small things, its willingness to spend millions to perfect a toll line but inability to render efficient service in villages.

The small exchange is a community center that requires the sympathetic personal touch of home ownership and management. The large exchange, or 1,000-mile toll line, is impersonal, a great public organization, the ownership of which is a matter of indifference to the telephone user.

Let the impersonal Bell organization handle that for which it is fitted. Let the Home company, the Independent, do the work for which it is fitted.

The strength of the Independent group lies in the intimate home touch—that acquaintance of the owner and the manager and the subscriber which results in service and satisfaction. Let this home touch be taken away and let it be supplanted by impersonal outside ownership, and the telephone company has only subscribers—no friends.

As has been stated, the dominating factor in the Independent group is the United States Independent Telephone Association. Partly by intention and partly by the trend of events, this association, today, finds itself the recognized representative of the Independent group. It assumes to speak for Independent telephony.

The members of this association, knowingly or unknowingly, have become a part of a dominating corporation. Those telephone companies that are not members of the association are controlled by the actions of the association.

With the power that it has gained have come many serious responsibilities. I would fall far short of my duty did I only call your attention to the growth and strength of your association and failed to impress you with the serious responsibilities that the association and you have assumed.

Let us study ourselves—our association—let us determine what kind of an organization we are and what kind of an organization we desire to be. From a loosely-organized association, whose main purpose was the holding of a successful annual convention and thereby bringing into yearly contact the varied interests of Independent telephony, the association has changed to an active corporation, constantly called upon by its members, state and federal authorities and the general public, to aid in solving the telephone problems.

The association was formerly a great political body, representative of but in no way controlling the many Independent companies in the United States, whose interests were too diversified, its members thought, to enable those interests ever to be welded into a great corporation with one definite purpose.

Today the association is one of the great business organizations of the nation—controlling directly 600 subsidiary corporations and indirectly 6,000 other non-member companies. This may be a startling statement to some companies who have regarded themselves as operating alone and unrestrictedly. But this past year decisions have made for each of you by the association—effective influence has been exerted for you—in some instances powerful influence has been used to restrain you.

There are twenty Class A Independent companies. All of them are members of this association. There are 103 Class B Independent companies, of which seventy-two of them are members of the association. The other 488 members of this association are Class C and D companies. For the first time in the history of the industry uniform reports are available—those for the year 1915 now being on file in the offices of the Interstate Commerce Commission in Washington, D. C.

Owing to lack of facilities and the incompleteness of a number of the Class C and D reports, it was thought wise at this time to make a study only of the Class A and B companies of the association. These two great groups are representative of Independent telephony. Their operations are comparable with the operations of the subsidiary companies of the Bell group.

The following compilations are most interesting and valuable, proving the contention of your officers that this great association is made up of strong units, each powerful in its own field and together constituting a great business corporation. Our twenty Class A companies operated, in 1915, 614,779 stations. Our Class B companies operated in the same year 313,789 stations, a total of 928,568 stations. From the reports of these companies to the Interstate Commerce Commission we obtain the following data:

Number of stations—	
A Class	614,779
B Class	313,789
Combined	928,568
Investment in fixed capital—	
A Class	$134,118,847.81
B Class	35,314,409.11
Combined	169,433,256.92
Capital stock issued—	
A Class	$ 59,933,149.67
B Class	20,624,801.25
Combined	80,557,950.92
Funded debt outstanding—	
A Class	$ 52,064,405.00
B Class	9,668,231.33
Combined	61,732,636.33
Interest paid in 1915—	
A Class	$ 2,359,047.16
B Class	390,509.11
Combined	2,749,556.27
Dividends paid in 1915—	
A Class	$ 2,341,944.11
B Class	854,489.26
Combined	3,196,433.37
Charges added to fixed capital—	
A Class	$ 7,741,285.44
B Class	2,085,044.93
Combined	9,826,330.37
Number of exchanges operated—	
A Class	744
B Class	522
Combined	1,266
Number of stockholders—	
A Class	9,644
B Class	10,751
Combined	20,395
Total exchange revenue—	
A Class	$ 16,270,040.87
B Class	5,673,541.60
Combined	21,943,582.47
Total toll service revenue—	
A Class	$ 2,811,568.05
B Class	921,884.98
Combined	3,733,471.03
Total miscellaneous operating revenues—	
A Class	$ 240,518.03
B Class	67,999.96
Combined	308,517.99
Total operating revenues—	
A Class	$ 19,323,064.97
B Class	7,740,223.80
Combined	26,063,288.77
Total maintenance expense—	
A Class	$ 6,132,126.70
B Class	1,943,370.34
Combined	8,075,497.04
Depreciation of plant and equipment—	
A Class	$ 2,879,393.68
B Class	889,075.57
Combined	3,768,469.25
Total traffic expense—	
A Class	$ 2,937,913.33
B Class	1,233,483.30
Combined	4,171,396.63
Total commercial expense—	
A Class	$ 1,632,300.52
B Class	399,798.79
Combined	2,032,099.31
Total general and miscellaneous expenses—	
A Class	$ 1,135,854.47
B Class	615,217.80
Combined	1,751,072.27
Total operating expenses—	
A Class	$ 11,978,544.38
B Class	4,224,156.76
Combined	16,202,701.14
Taxes assignable to operations—	
A Class	$ 1,048,800.71
B Class	308,655.37

Combined		1,357,456.08
Operating expenses plus taxes—		
A Class	$	13,027,345.09
B Class		4,532,822.13
Combined		17,560,167.22
Net earnings		8,503,121.55
Balance to surplus		2,557,131.91

Reduced to averages per station, we find as follows:

Average investment in fixed capital per station—		
A Class	$	218.32
B Class		112.54
Combined		182.49
Average capital stock issued per station—		
A Class	$	97.50
B Class		129.46
Combined		86.07
Average funded debt outstanding per station—		
A Class	$	84.54
B Class		30.81
Combined		66.48
Interest paid in 1915—average per station—		
A Class	$	3.80
B Class		1.21
Combined		2.96
Dividends paid in 1915—average per station—		
A Class	$	3.80
B Class		2.72
Combined		3.44
Average exchange service revenue per station—		
A Class	$	26.46
B Class		18.08
Combined		23.55
Average toll service, revenue per station—		
A Class	$	4.58
B Class		2.96
Combined		4.92
Average miscellaneous revenue per station—		
A Class	$	0.39
B Class		.21
Combined		.33
Average total operating revenue per station—		
A Class	$	31.43
B Class		21.48
Combined		28.04
Average total maintenance expense per station—		
A Class	$	9.97
B Class		6.19
Combined		8.69
Average depreciation of plant and equipment per station—		
A Class	$	4.68
B Class		2.83
Combined		4.05
Average total traffic expense per station—		
A Class	$	4.78
B Class		3.93
Combined		4.49
Average total commercial expense per station—		
A Class	$	2.65
B Class		1.27
Combined		2.18
Average general and miscellaneous expense per station—		
A Class	$	1.85
B Class		1.96
Combined		1.88
Average total operating expense per station—		
A Class	$	19.48
B Class		13.46
Combined		17.44
Average taxes assignable to operations per station—		
A Class	$	1.70
B Class		.98
Combined		1.46
Operating expenses plus taxes—expense per station—		
A Class	$	21.18
B Class		14.44
Combined		18.88
Total revenues		26,063,288.77
Total expenses		17,560,161.22
Net	$	8,503,121.55

We have then, without including the Class C and D companies, a great corporation operating plants in practically every state in the Union whose aggregate capitalization is $142,290,587.25; whose aggregate investment in fixed capital is $169,433,256.92; whose aggregate revenues are $26,063,288.77; whose aggregate expenses are $17,560,167.22, and whose payment for interest and dividends is $5,945,989.64, leaving a balance to surplus of $2,557,131.91.

When those B companies that are not members of the association are included, the Independent A and B Class companies operate 1,017,753 stations with an investment in fixed capital of $180,491,540.92, and aggregate revenues of $28,726,113.42.

Is not a corporation which makes such a showing as this a successful business organization? Has it not a right to maintain that it is on a solid financial footing?

These figures are submitted to bring out the extent of operations of this association's member companies, to explain to you how extensive those operations are and to call your attention to them in the hope that a detailed study of them by you will be a profit to your own company. This is a great business organization owning exchanges in hundreds of important cities and connecting those exchanges with great toll systems.

Your attention is especially called to the fact that in 1915 the A and B companies of this association invested in the extension and improvement of their plants $10,000,000. One of the problems that confronts this association is the problem of aiding its subsidiary companies in their financial operations. In the next five years, assuming that the growth of 1915 will continue, $50,000,000 will have to be provided for the A and B Class companies alone.

In his statement descriptive of financial conditions surrounding the railroad companies in their operations, Alfred P. Thom, representing the railroads before the Newlands committee investigating the problem of the common carriers, said, in effect, that the spirit of adventure no longer exists in the railroad business.

This statement applies equally to conditions in the telephone industry. For a time this spirit of adventure actuated the investment of huge sums in new plants—actuated the organization of companies in every city and hamlet in the country, but this spirit of promotion, of adventure, no longer helps the telephone finances. As Mr. Thom also said, "Only a showing of earnings, only the convincing arguments of cold facts based on the experience of years will obtain for any company money with which to extend its facilities or refund its maturing debt."

I have said the association controls its member companies. The association has said it will back to the fullest extent of its resources its contention that no non-competitive Independent telephone property shall be sold to the Bell company.

An organization whose members own thousands of plants located in practically every state in the Union, whose other members own great manufacturing establishments—the greater whose market the greater their ability to supply required apparatus—such an organization cannot look with favor upon the letting go of a single Independent property.

This organization as a business organization cannot allow any of its subsidiary companies to sell its property to the Bell—it cannot sustain a loss without a corresponding gain at some other point.

The total investment—in fixed capital of the association's member companies must show no diminution. This is business logic. Your directors are determined to use every means within their power to maintain the integrity of the association investments.

The association has said that if existing laws do not provide the means for securing access to the great toll lines of the Bell group, then the association will do its utmost to secure the passage of laws that will provide the means of securing that access.

When the association takes this stand and is ready to fight to maintain it, does not the association take charge of the property of every member?

Does not the association assume control? Does not the association in limiting the sale of Independent properties take a part in every company's finances—does not the association in its attitude toward toll connections take a part in every Independent compan's traffic?

In its attitude toward regulation by state and federal commissions, does not the association affect every company?

Knowingly or unknowingly, every member of this association has become a partner in this controlling influence and has assumed a share of the responsibility. The time has come for the members to say whether the association shall develop as a business institution, aiding its members as a matter of business, or whether the association shall relapse into a convention-holding political organization.

The latter way is easy. The former will be hard—full of difficulties—but to my mind is the only sure guarantee of the stability of Independent companies.

The growth of the association into its present position has been gradual, but it now finds itself with a power partially obtained for it by its own efforts and partially given to it by those who for years have been seeking an organization able to speak for the Independent group.

Has not this association the right to inquire what is being done to protect its subsidiary property in Jacksonville, Atlanta, Mobile, Dallas, Los Angeles, Portland, St. Paul, La Crosse, Grand Rapids, Toledo, Cleveland, Erie, Buffalo and Philadelphia?

Has not the association the right to expect that every effort will be put forth to develop a toll system that will extend from the magnificent property of the Gary system in Kansas and Missouri to that other wonderful subsidiary, the Keystone system, in Philadelphia, connecting the Kinloch, the Indianapolis, the Ohio State, the Pittsburgh and Allegheny, and United telephone companies, thereby forming a great highway half way across the continent, over which may be sent the messages originated at the thousands of lesser Independent exchanges connected with the greater system?

Has not the association the right to expect a toll system extending from Saginaw to Louisville—from St. Paul to Waco?

What right has any one of these subsidiary companies to break the connecting chain by a sale to the competitor? How in protecting its subsidiaries can the association escape saying to all Independent companies not a part of the association: "You cannot dispose of your property to the Bell company as long as the laws of the nation and the state provide this association with the means of saying you shall not?"

If the association is interested in this way in all these matters—if the association has the power and the right to require all Independent companies to remain Independent, does there not go with this power a great responsibility—a responsibility great in proportion to the rights claimed and powers exercised?

The association's financial statement shows the expenditure of $10,000,000 in 1915 in extensions and improvement of its A and B plants. If the association says that none of these plants must pass from Independent control, does not the association resume the responsibility of providing the financial assistance that will be needed year after year to keep these plants in such a condition as will enable them to maintain their position as a utility fully serving the public in its territory?

When the association expects to preserve and build up its great toll system, does it not assume the responsibility of supplying not only financial assistance but engineering aid as well, so that the system may be developed as an entirety?

When the association says, "You shall not sell your plant to the Bell," does not the association assume the responsibility of supplying an Independent buyer for a property that for any reason must or should change owners?

When complications result in competitive situations, shall the association leave the untangling to the local organization or shall the association, living up to its responsibility, propose the plan that shall solve the problem?

If the association is not to continue along its present lines, as I have said, the alternative is the easy way—a resolution will do it. But if the association is to live up to its responsibilities, then there must be a branching out—the adoption of new methods—a larger organization.

The association in my opinion, and I think the other officers will agree with me, has been handicapped by having to transact much of its important business through committees—committees composed of men more than busy attending to their separate company duties.

No business institution can accomplish anything when working through committees. Political organizations and city councils work through committees, but no business corporation works that way. The reason is obvious—business demands results. Results can be obtained only through efficient effort and efficient effort is the result of individual responsibility.

The association should place the responsibility for the conduct of its business on its officers and employes and should outline to those officers the lines along which they are to work, and require results.

In exercising its powers, the association has taken a part in the operating, engineering, commercial and accounting departments of every company. It should assume the responsibility of being of service in those departments.

To do this the association treasurer must handle this year $50,000 instead of $25,000. The gross operating revenues of but two groups of members of this association amounted, in 1915, to $26,000,000. Were these companies members of the Bell group, they would have paid into the treasury of that group 4½ per cent of their gross receipts, or a total for the membership of $1,172,000 for the privilege of membership. They did pay into the Independent association $25,000, less than one-tenth of 1 per cent. If this amount could be increased to one-fifth of 1 per cent, sufficient

funds would be derived to produce results that would be of the greatest benefit to every Independent company.

Responsibility always goes with power. The 20,000 men who have invested in the stock of your Class A and B companies demand that their investment be protected. The 300,000 holders of stock in Independent C and D companies demand not only that their stock but their service be protected. The United Independent Telephone Association has power to control these companies. Upon it rests the responsibility of giving this protection to these stockholders.

Adaptation

There are hundreds of big men in business today who are not men of exceptional natural ability. Most of the men holding the good jobs are men of ordinary ability. They have reached their present positions not by what we usually consider exceptional ability, but by exceptional adaptability. Most of them started in a small way, possibly having had to adapt themselves in the first place to their pocketbooks and get into the first thing that came along, without even the opportunity, which is offered the few, of looking around and selecting their work. They became recognized by their ability to adapt themselves to the work which they had to do. Their individual natural tendencies to work were exercised and developed to meet the requirements of their particular vocation. They applied themselves to the learning of their business by knowing all about each job that they were given and, at least, a little about the job of the man ahead. Staying with the job and learning all about it thoroughly, to such an extent that one is an authority in his line, is real ability. Nor does it take a wizard to do it. Knowledge of one's work is the substitute for natural brilliancy, says W. L. Holley in the *Pacific Telephone Magazine*.

Business today is the work of the ordinary man. How frequently you have noticed that the man who was your most brilliant classmate in school or college is looking "seedy" a few years after, and when you ask him what his business is, he informs you that he has been in the real estate business for a while, but that he is just about to go on his "dad's" ranch out in the "Dry Dust Valley." In the next block you meet a man that you and everybody else of your acquaintance thought was dull when he was in school, and he tells you that he is manager of the "P. D. I." Railway. The one was too brilliant to adapt himself to the drudgery and routine of an office, the other mobilized all that he had when he finally landed a job—his adaptability and "stick-to-it-iveness"—and has found his reward.

Adaptability means shaping yourself to your work, meeting with at least seeming equanimity the many disagreeable exigencies of the job; playing the game according to the rules your "boss" imposes; conforming to the policies of your superior, whether or not they are agreeable or in accordance with your own peculiar notions of how the business should be run; remembering that if you do conform to them, your turn will come some day and you will be given a chance to try out all your pet schemes and ideas.

The measure of the ability and success of the young business man is, to a high degree, the extent to which he carries out his employer's ideas. The man of affairs nowadays who is an employer doesn't ordinarily expect you to "come through" every few days with a brilliant idea, nor is he looking for a man to revolutionize or reorganize his business. He, no doubt, has done all of that sort of thing that he wants done, and if he did want it done, he would probably prefer to do it himself, thinking his own experience more suited to the demands of such a process. He wants a man to adapt himself, to learn the business, "a reliable sort of person, of good common sense," one upon whom he can depend. He wants and expects the new man to spend his early term of employment in mastering the routine and fundamentals of the business, for by such training only can he hope to be able ultimately to do the bigger things.

During the process of absorption, a little "browsing" around on the edges of the territory of the man higher up is not to be decried. This means the broader view of one's work. Let the employe make it his business to understand the policies of his superior to such an extent that he can interpret for himself the occasional irregularity or unusual condition which arises. The man who can be counted upon for initiative and judgment in an emergency is of more value than the merely faithful plodder.

The greatest aid to a man in his work is a genuine interest; a warm, though possibly silent, enthusiasm; a pleasurable enjoyment to be engaged in work—his particular kind of work. It is something to be acquired if you haven't it. It may be that a man's work in itself is one that is not of itself particularly interesting. It may be a kind of work that many would call positively disagreeable. And yet he can enjoy it if he wants to. There is something about it that can be cultivated which will yield satisfaction in the doing. No matter what kind of work it is, there is something individual in it, something characteristic. One will find satisfaction in doing something different from the rest.

Adaptation is not only an attribute to be cultivated by the employe, but as much by the employer. It is fortunate and noteworthy that a great deal of study and science, in a certain sense, is being given and applied to the possibilities for increased efficiency in suiting or adjusting the work to the man.

"Maybe his ability, if directed along somewhat different lines, will be more useful. There are some mighty good points in his work and make-up. Suppose we try him over here. He knows a lot about the business, his knowledge of it is useful and, at least, he will be better than breaking in a new man."

The ordinary man, and he is the majority, can not make good from the first minute he is put in his job. He must be trained. He must accustom himself to the new routine. To be thoroughly competent, he must be able to stay with the job long enough, not only to do his work, but to know why he does it. The successful executive spends most of his time training his assistants and building up his organization. He does not hesitate to figuratively roll up his sleeves and do a thing himself in order to demonstrate how it should be done. He doesn't say, "Do this," but "Do this as I shall show you, for 'such and such' reasons." He is willing to show you a second or third time. He is a long-suffering individual. Many failures are made because the "boss" forgets how long it took him to learn the same thing. Let the "boss" give the new man the full benefit of his experience and the new man, with his newer ideas plus the "boss's" experience, may do it better than the "boss" ever did.

Therefore, whether employer or employe, remember the necessity for adaptability. This quality, if exercised by the former, means greater results from his employes; if cultivated by the latter, it means that his own success will be found in the success of his employer.

Physical Connection Wins in Michigan

State Supreme Court Upholds Commission's Order—Full Text of Decisions

ON the eleventh day of June, 1914, the Michigan Railroad Commission made an order: "That the Michigan State Telephone Company and the Citizens Telephone Company, two Michigan corporations, make such a physical connection or connections between their toll lines or system in the City of Traverse City as is required for the furnishing of toll line service to the subscribers of each company at the stations installed in their residences and places of business over the toll lines of the other company." The order was granted upon the petition of certain residents of Traverse City, who are said to represent in their application a large number of their fellow townsmen. Complainant (the Michigan State Telephone Company), as one of the companies affected by the order, brings this suit (filed December 21, 1916), under the provisions of the statute, asking that it be vacated and set aside.

It appears from the record that both the Michigan State Telephone Company and the Citizens Telephone Company have exchanges in Traverse City. The Citizens Company has by far the larger number of local subscribers, 1,740 as against 479 of the Michigan Company, but the latter has the more extensive toll system, and handles a larger number of outgoing and incoming messages. The lines of the latter company not only afford better long distance facilities but reach every, or nearly every, city and village in the vicinity of Traverse City, while those of the Citizens Company fail to reach a number of important neighboring towns. Testimony was given explaining the telephonic connection of Traverse City with the exchanges in about fifty other places in that part of the state. For the purpose of more clearly understanding the situation these places may be roughly divided into three groups.

In the first of these groups, comprising more than half of the places considered, the Michigan Company operates the only exchange now in existence. Formerly there were two exchanges in each of these towns, the one owned and operated by the Michigan Company, and the other by what was known as the Swaverly Company. At that time the Citizens Company in Traverse City, and other so-called Independent companies in other places, were connected with the exchanges of the Swaverly Company so that the subscribers of the one could talk with the subscribers of the other. About March, 1912, the Michigan Company purchased from the Swaverly Company all of its property and business and united the exchanges of the latter company with its own. But, as a condition of the merger, it was required by the Railroad Commission that the Citizens Company should be allowed to continue the same connection with the exchanges thus consolidated that had before existed with the Swaverly exchanges. As a result of this requirement the toll lines of the Citizens Company have continued to be, and are, connected with the switchboards of the consolidated exchanges in all of these Swaverly towns, as we will call them, so that the subscribers of either company in Traverse City are able to talk with the subscribers of the Michigan Company in the thirty or more Swaverly towns as if they were all reached by the same telephone system. In addition to these so-called Swaverly towns there are a large number of places in the southeastern part of the state, including the City of Detroit, with which the holders of Citizens telephones have the same kind of connection, and from the same cause. With the towns in this group the present order of the Commission will afford no new or additional facilities of communication to the residents of Traverse City.

In the second of the groups into which we have divided the towns around Traverse City, full competition still exists between the two telephone companies. There are in this group about nine cities and villages, and between these towns and Traverse City the Michigan Company and the Citizens Company has each its own toll line, and in them each maintains its own exchange. As between Traverse City and these towns the subscribers of one company cannot talk from their own telephones with the subscribers of the other, and will not be able to do so unless the physical connection is made between the lines of the two companies as required by the order of the Railroad Commission.

The third group is also composed of some nine or ten towns, and includes places of considerable importance. In these towns the Michigan Company has the only exchanges and its toll lines are the only ones connecting them with Traverse City. With the residents of these towns and subscribers of the Citizens Company in Traverse City have no telephonic communication except by becoming subscribers of the Michigan Company, or by going to the public stations of that company.

Traverse City, according to the census of 1910, has a population of more than 12,000. It has wholesale and jobbing concerns patronized by merchants of surrounding communities. And it is the site of the Traverse City State Hospital for the Insane, which receives patients from the thirty-seven counties of the northern portion of the lower peninsula. The business men of the city must necessarily have telephonic communication, not only with residents of the city, who mostly use the Citizens telephone, but also with towns of the third group, which can be reached only over the lines of the Michigan Company. This forces a duplication of instruments, and there are 188 subscribers in the city who feel obliged to, and do, keep both telephones. And in asking for the order in question it was the object of petitioners to obviate the expense of two telephones, where one could be made to answer the purpose of both, and to bring about the same facilities of communication among telephone subscribers in the city, and between them and the towns of the second and third group, that they now have with the numerous towns of the first, or Swaverly group, and with the towns and cities in the southeastern part of the state.

Upon the hearing of the case in the circuit court the order of the Commission was upheld and a decree entered dismissing complainant's bill. From this decree, complainant, the Michigan State Telephone Company, appeals to this (the State Supreme) court.

The power of the Railroad Commission to regulate the business of telephone companies is to be found in Act 206 of the Public Acts of 1913, and authority to require the physical connection of telephone lines is contained in Section 6 of the Act, which reads as follows:

Whenever the commission, after a hearing had on its own motion or upon complaint of any party in interest, shall find that a physical connection can reasonably be made between the

lines of two or more persons, copartnerships or corporations operating telephone lines, whose lines by such connection can be made to form a continuous line of communication, and that public convenience and necessity will be subserved thereby, or shall upon like motion or complaint find that two or more persons, copartnerships or corporations so operating telephone lines have failed to establish joint rates, tolls or charges for services by or over their said lines, the commission may by its order require that such physical connection be made, and may prescribe through lines and joint rates, tolls and charges to be made and to be used and observed in the future. If such persons, copartnerships or corporations so operating telephone lines and telephone facilities do not agree upon the division between them of the cost of installing of such physical connection or connections, or the division of any joint rate, tolls or charges established by the commission over such through line, the commission shall have authority, after hearing to establish such division.

Upon considering this section of the Act, it will be observed, in the first place, that the Railroad Commission is given no authority by the statute to require a physical connection between the lines of two or more persons, copartnerships or corporations operating telephone lines, unless the lines, by such connection, "can be made to form a continuous line of communication." Complainant insists that this means a "continuous line of communication" between places not already connected by any telephone line, and that it does not apply to such a situation as that at Traverse City, which is now connected with practically all other places by the lines of the Michigan Company. If the lines of the Michigan Company, counsel say, in illustrating their position, ran only from Charlevoix to Traverse City, and the lines of the Citizens Company ran only from Traverse City to Cadillac, then the lines might be required to connect so as to form a continuous line of communication between Charlevoix and Cadillac. And counsel argue that the statute should be so construed as to authorize the requirement of physical connection between telephone lines only in situations substantially covered by the illustration. In other words, it is counsel's position that in the hypothetical case, connection of the lines might be required, under the statute, so that subscribers of the Citizens Company in Cadillac could talk with subscribers of the Michigan Company in Charlevoix, but that it could not be required so that subscribers of the Citizens Company in Traverse City should have the same privilege. In this we think counsel for complainant attempt to read into the statute a limitation not expressed by its language. There is nothing said about existing lines of communication, or the absence of such lines. Nor is the continuous line spoken of restricted to communication between different towns and cities. *We think the statute must be held to give the Commission authority, if other necessary conditions exist, to order a physical connection of telephone lines whenever and wherever those lines "by such connection can be made to form a continuous line of communication," whether the communication is between different towns or between subscribers to different telephones in the same town.*

Complainant also claims that an enforced physical connection between its lines and those of the Citizens Company would not be an exercise of the right of regulation, but would amount to such a taking of its property as could be justified only under the power of eminent domain and upon the payment of compensation. As the basis of this contention it is argued that the Citizens Company would be given the use and control of complainant's lines every time one of its subscribers talked over them by means of the connection. In support of this position our attention is directed to Pacific Telephone and Telegraph Company v. Eshleman, 166 *Cal.* 640. With all due respect for that court, however, we find ourselves unable to agree with its conclusion as to the effect of a connection between competing lines. The business of a telephone company is to transmit oral messages from one point to another, and for that purpose every patron, *whether he is a subscriber or not,* has the use of its lines for the time being. That is the public use to which they are dedicated. *Without the physical connection each subscriber to a Citizens telephone is entitled to the same use of complainant's lines that he would have with the physical connection, the difference being that with the lines connected he can talk from his own telephone, while without the connection he would be obliged to go to a public station of complainant company.* The relations of a telephone company in this state are not simply with its own subscribers but with the public generally, and it is forbidden by law to make any discrimination between persons.—*How. 2nd,* p. 7221. Complainant would have the same control over its own lines if the Citizens subscriber should talk from his house or office that it would have if he should talk from one of complainant's public stations; and complainant, not the Citizens Company, would receive compensation for the use of the lines. It would amount simply, so far as this phase of the matter is concerned, to a difference in the way messages were got to and from the Citizens subscribers, and would be, not a taking of property by eminent domain, but a regulation in the interest of the public. This conclusion, we think, is in accordance with the weight of authority.—Pacific Tel. & Tel. Co. v. Wright-Dickinson Hotel Co., 214 *Pac.* 666; Pioneer Telephone & Telegraph Co. v. Grant County R. T. Co., 38 *Okl.* 554; Wisconsin Telephone Co. v. Railroad Commission, — *Wis.* —, 156 *N. W. R.* 614.

In one sense there may be, and often is, a taking of property through the legitimate exercise of the power of regulation, and as necessarily incident thereto. In such case the company whose business is subjected to the regulation is not deprived of the title to, or possession of its property, but it may be required to forego profits which it might otherwise receive; to apply its property, within the dedicated use, to some purpose, contrary to its wishes; to expend its money as it would not otherwise expend it; to perform service it would not perform except for the regulation, and to submit to losses which it would prefer to avoid. In Wisconsin, M. & P. R. Co. v. Jacobson, 179 *U. S.* 287, the railroad company was required to expend its money for a railroad connection, and to submit to certain losses in revenue. In Chicago, M. & St. P. R. Co. v. Iowa, 233 *U. S.* 334, the company was required to accept and transport loaded cars received from other railroads although it was willing and desired to use its own cars for the purpose. In Worcester v. Norwich & W. R. Co., 109 *Mass.* 103, the company was subjected to heavy expenses in establishing a union depot. And see Oregon R. R. & N. Co. v. Fairchild, 224 *U. S.* 510; Pittsburg C. C. & St. L. R. Co. v. Railroad Commission, 171 *Ind.* 179; Grand Trunk R. Co. v. Michigan R. Com. 231 *U. S.* 457, and many other cases. These relate mainly, if not wholly, to the connection of railroad tracks, *but the principles announced are applicable to the control of any public utility by the state.*

Inasmuch as the regulation of public utilities by the state is thus, and necessarily, an interference to some extent with private property, it can be justified only by the demands of public convenience and necessity; and the regulation must be reasonable having in view the public interest to be subserved and the extent of the burden imposed.—Oregon R. R. & N. Co. v. Fairchilds, *supra;* Gt. Northern Ry. v. Minnesota, 238 *U. S.* 340.

The Commission has found that the physical connection of telephone lines as directed by the order in question is a public convenience and necessity, and we think it had sufficient grounds for that conclusion. The telephone has become a vital element in the business and social life of the people, and enters so largely into the conduct of all of their affairs that the elimination of unnecessary expense, and the saving of time in its use, have become matters of importance. Men can no longer afford to loiter around public pay stations for the purpose of sending or receiving messages, and the duplication of instruments in the house and office has grown into a waste of large proportions. These evils come largely from the existence of competing companies in the same community, and so far as reasonable regulation can improve the situation such regulation is assuredly required by public convenience and necessity. Communities should not be held up until one or the other of adverse companies has been eliminated through the long battle of competition, if the delay can be justly and lawfully avoided. This was evidently the view of the legislature when telephone companies were brought under the control of the Railroad Commission, and that body was given the powers of regulation conferred by the statute referred to. It is suggested, however, by counsel for complainant that the evils mentioned as furnishing grounds for regulation in the interest of the public are evils common to all competition between telephone companies, and could not have been within the contemplation of the legislature, when it required in each case, before action by the Commission, a special finding that public convenience and necessity would be subserved thereby. In answer it may be remarked that the existence of a public necessity in each particular case would not be diminished by the existence of the same public necessity in all cases. And the results of competition must vary as between different localities, so that the question remains in every instance whether public convenience and necessity require action on the part of the state in that particular case. It is also suggested by complainant that the connection of lines at Traverse City is not necessary because the residents of that city can rid themselves of the troubles of which they complain by surrendering their citizens telephones and substituting those of the complainant company. This is the solution that competition always holds out to the public. But experience has shown that it is not a very practical solution, and it ignores the necessities of the outside public which requires facility of communication with Traverse City as much as Traverse City requires facility of communication with the outside public. And this public necessity spoken of in the statute is not an absolute necessity. We agree with the Supreme Court of Wisconsin that "if there was a strong or urgent need of the connection here sought, then there was a necessity for it." Wisconsin Telephone Co. v. Railroad Commission, *supra.* And there was evidence justifying the Commission in finding the existence of such need.

That a physical connection may be required, in many instances at least, between the lines of competing companies without injury to either is clearly shown by the record in this case. The toll lines of the Citizens Company and those of the Michigan Company both run into the same exchanges in the thirty cities and villages of the Swaverly territory, as well as into the exchanges of the more numerous places in the southeastern part of the state. While this arrangement may not constitute a technical connection of the lines, it yet has the effect as to toll service of a physical connection. Neither party complains of injury from this mutual service while the results are unquestionably beneficial to the public. And complainant may well be required by the Commission to extend the same facilities generally to the residents of Traverse City unless it has been able to show some insuperable objection to doing so.

The objection complainant does raise as to the reasonableness of the order in question relates entirely to its effect upon its local exchange in Traverse City. That exchange, it says, will be destroyed if the order goes into effect. It bases this conclusion upon the fact that the business houses of the city find it necessary, without the connection, to use its telephone in communicating with the towns in the third group, as we have classified them, to which complainant has the only toll line. These telephones will be no longer required, it says, if, by means of the connection, these towns can be reached from the telephones of the Citizens Company. And it further claims that with the removal of its telephones in the city the value of its toll service with the Swaverly towns must be much impaired.

Undoubtedly complainant might suffer some loss if these results should in fact follow the enforcement of the order, yet just what the loss might amount to we are unable to determine with any accuracy from the record. But we do not think that complainant has shown with sufficient certainty that the apprehended results would in fact follow the enforcement of the order. And it is insisted by the Railroad Commission that they would not. The Commission has full power under the statute to prescribe the joint rates, tolls and charges to be made for the use of the connection and to determine the division of such rates, tolls and charges if the parties interested fail to agree upon the division. In fixing these rates, tolls and charges the Commission seems to have a very large discretion, and while unquestionably they must be reasonable when all the circumstances affecting the situation are taken into consideration, yet they are not necessarily limited to the actual cost of operation or even to an ordinary profit thereon. In fixing the rates, tolls and charges the Commission may undoubtedly take into consideration all of the equities growing out of the regulation and make use of the rates in adjusting those equities. This the Commission says it intends to do, and it has retained jurisdiction of the matter for the purpose of fixing and adjusting the rates, tolls and charges if the parties themselves fail to agree upon them. And the Commission insists that a proper adjustment of rates, tolls and charges will prevent the injurious results anticipated by the complainant. It is the purpose of the Commission, it says, not to make use of the rates, tolls and charges by way of compensation, but to prevent the occurrence of loss. In other words, a proper adjustment of the rates, tolls and charges will, in the judgment of the Commission, remove all inducement on the part of complainant's subscribers in Traverse City, to discard the telephones they now hold from complainant, and thereby to injure its local exchange.

Will the adjustment of the rates, tolls and charges, when properly made, remove the danger of destruction of its local exchange which complainant fears? The whole thing, both as to the danger of loss and as to the remedial provisions intended by the Commission is somewhat a matter of speculation. It is for complainant to show affirmatively that the physical connection ordered by the Commission will inflict upon it an undue loss and

one that cannot be prevented by the contemplated adjustment of rates, tolls and charges. The interest of the public in a proper regulation of public service corporations is continually becoming more vital and important, and any action of the state through its organized boards and commissions in the exercise of that power should not be set aside by the courts except in instances of the clearest necessity. This is the view taken by the Legislature. Section 18 of the Act explicitly declares that,

In all actions under this section the burden of proof shall be upon the complainant to show by clear and satisfactory evidence that the order of the commission complained of is unlawful or unreasonable, as the case may be.

What rates would be required to prevent the surrender of complainant's telephones by such residents and business houses of the city as now employ them is not shown by the record. Nor is it shown that an adjustment of rates, tolls and charges by the Commission under its powers as we have construed them could not be so made as to obviate the injurious results which complainant apprehends from an enforcement of the order. And from the very nature of the order it is within the power of the Commission to rescind it if it is found to operate unduly to complainant's injury. For these reasons the decree appealed from will be affirmed, with costs to the defendant.

A. T. & T. Rings the Christmas Bell

Prompted by the "unusual conditions now existing" Theodore N. Vail, president of the American Telephone & Telegraph Co., announced before Christmas that the companies constituting the Bell Telephone System would divide $6,000,000 in bonuses between certain classes of their employes.

The following statement was issued:

"By co-operative action on the part of the companies constituting the Bell Telephone System, certain classes of their employes throughout the United States will be aided in meeting the unusual conditions now existing by an extra cash payment, or payments, equivalent to two or three weeks' salary, according to length of service.

"Employes who have been in the service for over one year, and who are receiving $3,000, or less per year, will receive the equivalent of three weeks' pay, while those of the same class who have been in the service over three months, but less than one year, will receive the equivalent of two weeks' pay. Employes receiving over $3,000 and less than $5,000 per year, will also participate in the payment, but not in the same proportion as those receiving the lesser rate of pay.

"This is not intended to be a distribution of profits, nor do all employes participate. It is intended to help those employes whose margin between income and necessities is narrow.

"These payments will not take the place of the wage increases for demonstrated merit, or the readjustments to meet changed conditions of service usually made at this time of the year.

"All details as to the time and method of distribution will be arranged by the several companies constituting the Bell System as in each case, in the judgment of the local management may be for the best interests of their employes. It is estimated that the total amount to be distributed will exceed $6,000,000."

F. S. Whitman, division manager at Baltimore of the Chesapeake & Potomac Telephone Company, stated that 2,200 employes were effected in Baltimore, while C. N. Weber, division superintendent of a Virginia division comprising Richmond and Roanoke, stated that 1,500 were recipients in that state.

The Pioneer Telephone and Telegraph Company received $77,500 for its employes, according to F. C. Baker of Okmulgee, Oklahoma, and some 250 shared in the proceeds at Tulsa, according to George F. Bell.

"The Cumberland Telephone and Telegraph Company distributed to 2,047 employes in Tennessee some $50,000" said E. E. Bowsee of the Nashville office of the company.

Vernon Baird, the Hattiesburg, Mississippi, district manager, stated that some 850 were benefited in that territory, while in the New Orleans district $70,000 was divided up among 2,400 employes, while $25,000 was distributed among the 700 local workers.

D. F. Turnbull, general manager of Kentucky, stated that 1,300 workers in Kentucky received $45,000, of which the largest group was Louisville, with 375 beneficiaries.

Some $250,000 went to the Bellites of the Michigan State Telephone Company. Saginaw for example gave away $20,000 to 400 persons.

The Kansas and Missouri Telephone Company gladdened 3,000 with $100,000, Topeka alone receiving $10,000 for some 200 employes.

The Southwestern gave away $200,000 in the state of Texas alone, to 6,000 followers. A thousand of them in San Antonio accepted $25,000.

The Pennsylvania district of the Bell, including Camden, New Jersey, gave their 15,000 men and women over $750,000, the 5,000 Philadelphian employes receiving $250,000. The Western Union gave 600 employes about $40,000.

In the Northwest group with a 9,000 total in five states got $300,000. Omaha was handed $30,000, while F. M. McEniry, commercial superintendent of the Wisconsin Telephone Company, announced 2,800 shared in that company of which 1,400 were in Milwaukee, receiving $70,000.

B. E. Sunny, president of the Chicago Telephone Company, stated:

"There are at present approximately 160,000 employes of the Bell Telephone companies. Of this number Chicago has between 10,000 and 12,000 who will receive $500,000, and there is also a branch of the American Telephone and Telegraph Company here.

"We have had a prosperous year and feel that the loyal support of all employes has been responsible for this in a large measure. It was the wish of the directors and officers to give them a share of our profits, and we worked out a scale of distribution which we thought would be fairest for all concerned."

It looked for a while as if the Central Union, as it was in the hands of receivers, would get left, but its employes received a bonus just like the rest of the companies.

The Central Union offices in Youngstown have increased the pay of operators since Nov. 1. Monthly wage has been raised from $6 to $11, in each case depending on the length of service of the operator. The plan is part of a general expenditure for improvements, which is also taking the form of a new power house and other extensive additions and changes. It is understood that a fund of $10,000 has been set aside to be used by the Youngstown office of the Bell telephone for the purpose of increasing the pay of its operators alone.

Scientific Management In Automatic Exchanges

Paper Read Before the Western Efficiency Society in Chicago, November 10, 1916

BY W. LEE CAMPBELL

IN telling what progress we have made in the Automatic Electric Company's factory since we commenced to study and introduce the principles of scientific management nearly nine years ago, I might spend a great deal of time. But you have doubtless heard much about the use of efficiency methods in manufacturing operations; and therefore some results for which we have been largely responsible, but which lie outside of our factory, might be instructive and helpful.

Before I discuss the particular work which I wish to tell about, you may be interested to know that in our factory there is no question as to whether or not it is advisable to operate according to the principles of scientific management, because we feel that our conditions are such that it would be absolutely impossible for us to keep going unless we used such principles.

W. Lee Campbell, General Superintendent Automatic Electric Company.

We are continually purchasing and carry on hand for use in our manufacturing and installation work over 5,000 different kinds, sizes and shapes of brass, steel, rubber, German silver, platinum, fibre and other raw materials, and, in addition, we are continually purchasing and carrying on hand approximately 3,000 different kinds, sizes and finishes of screws, bolts, rivets and other items of hardware, together with insulators, tapes, switches and electrical instruments and appliances of various kinds.

We carry in our finished material store rooms, ready to be drawn into our assembling departments, a stock of each of approximately 20,000 different parts, manufactured either by ourselves or by outside suppliers. The time required to put these parts through their manufacturing processes varies from a few hours to several weeks.

A scheduled shipping date is placed on practically every sales order at the time it is received. The bulk of our business is received in large contracts, each of which must be completed by a prescribed date and very often there is a penalty clause attached. Consequently, we must have a central planning department, which has and uses complete and accurate records of all materials and parts required and available, the equipment required and available for manufacturing every part and the time required for the various operations on each part. In other features which I cannot take time to enumerate, we find it imperative at least to approximate scientific management.

I do not want anyone to think that we feel we have attained perfection; to the contrary, the farther we go the more we see to do, but the thought of attempting to turn back and do things in the old way never enters our heads.

Having tried out these principles to some extent in our factory, it occurred to us some years ago that it would be wise for us to endeavor to pass them on to companies operating automatic switchboards and telephones manufactured by us.

There were several reasons for this extension work. The most important of them were, first, like other manufacturers of automatic machinery which must compete with hand operated machines, the success of our product is dependent upon the results secured from it. In other words, unless the exchanges which we manufacture and install can be proved so efficient that they will furnish better telephone service at a lower cost than that which can be secured under similar conditions from manual systems, our business must eventually fail from lack of orders for new plants. Again, the plants already sold will not grow as they should and send us orders for additions if they are not managed so as to give satisfactory service to their users and profits to investors.

THE OPERATING DEPARTMENT FOR AUTOMATIC COMPANIES.

We, therefore, established what we call our Operating Department. Members of this department are experienced automatic telephone operating engineers and at the same time are well qualified by natural bent and training to do work along efficiency lines. The few men required have been hard to find; in fact it has taken years to develop some of them to anything like the efficiency of the present members of the department, but the results secured have repaid us many times for the expense, effort and time required.

When this department commenced its work, it was fairly common practice to let an automatic telephone exchange run along without much attention until a complaint from some dissatisfied subscriber was received. The more or less vague complaint of the subscriber was turned over to a switchboard attendant, who started out in accordance with whatever method seemed best to him, to determine what caused the complaint. Possibly he would decide the trouble was outside of the office, in which case, he would tell some other employe about it or hand him a scrap of paper on which a notation was made of the complaint. Maybe he would decide the subscriber had no cause for complaint at all, in which case he might stick the scrap of paper away somewhere for future reference, or throw it in the waste basket, just as he thought best in the circumstances. Every switchboard attendant handled complaints of all kinds, did adjusting, testing and the various other duties of the central office; everybody had to be an all-around experienced man.

To change all this, a number of things have been done. I will not attempt to name them in the order of their accomplishment, because they have really been worked out more or less in unison.

In the first place, a number of the automatic telephone operating companies in the state of Ohio banded themselves together in an organization which has met once a month for mutual criticism and improvement. Through the help and largely through the instrumentality of this association, accurate and scientific methods and forms were devised for handling and recording subscribers' complaints and other unstandard conditions, so that every kind of trouble which can now occur in any part of an automatic telephone plant has a code number, and every trouble, whether complained of by subscribers or detected by employes, is recorded by code number on standard forms which are handled in prescribed ways by a standard organization.

Every employe is supplied with written instructions as to his or her particular duties; for example, the complaint clerk, who receives the subscribers' complaint, is instructed what questions to ask the subscriber and what to say to close the interview. She is instructed what forms to use to record the information. These forms then pass to a tester who determines, first of all, whether the cause of complaint is in the telephone instrument, somewhere on the line between the instrument and the office, or in the office itself. When the complaint has been properly classified, it is referred to the particular department which handles complaints of that kind. Every complaint is stamped with the date and hour of its receipt and a copy of it is kept by the tester until he is assured that the cause of it has been removed.

A record is then made of every complaint on prescribed forms which show all complaints made by each subscriber, the date on which each is made, what workman handled the case and what trouble he found. A similar record is kept of the troubles charged against each of the principal machines or pieces of apparatus in the central office. The methods used in keeping this record are such that if an unstandard condition recurs after a comparatively short interval, the repetition is apparent and all such repetitions are referred to a supervisor who gives them special attention. Furthermore, the rating of employes depends not only upon the number of troubles cleared and the time required to do it, but upon the number of "repeats" charged against them.

TROUBLE CURED BEFORE IT STARTS

The greatest improvement, however, was brought about by proving in the theory that most of the disorders could be found and removed before subscribers had any occasion to complain, and that in this way better service could be given at lower cost. To accomplish this, two things were done. In the first place, our Operating Department, in co-operation with several experts of recognized ability in the employ of customers, worked out a written set of instructions as to how each spring or other working part of each of the mechanisms should be adjusted to give the best results in service. Following this, written instructions were prepared defining various routine inspections, tests, oilings, adjustments, etc., which should be made, and the intervals between the performance of each "routine."

Some of these routines were to be performed each day, some once a week, some once a month, some once in three months, but they were so complete and so carefully prepared and suited to local conditions that no central office equipment to which they are applied can possibly do otherwise than give good service; whereas, in the old days, we had some sad experiences due to switchboards being neglected until those in charge were swamped by the work of finding the specific troubles complained of by subscribers, and had no time to make routine tests and adjustments.

THE "SERVICE CHIEF"

With the introduction of these routines and written instructions, a change in central office organization was made. The old scheme of having everybody do everything was abandoned and the employes were classified. Many routines were so simple that a boy or girl could be taught to do them under the supervision of a "Service Chief." "Service Chief" was a new title given to but one employe (unless an exchange is a very large one) who, under the new system, finds time to receive all subscribers' complaints which are due to central office equipment, and to make the necessary inspections or tests to locate the causes of the complaints.

When each cause is located, he either applies the remedy himself, if it can be done without an appreciable amount of time, or turns the offending piece of apparatus over to a skilled repair man, who specializes on that work in addition to performing difficult routine adjustments and tests which the apprentice or apprentices are unable to do.

This division of employes into apprentices, adjusters and service chiefs, soon made the all-around experienced man more or less of a drug on the market and resulted in much better service at lower cost. In addition, it made it possible for us to close down a school which we had maintained in our factory for years for training switchboard attendants, because under the new system, it was possible to start men in as apprentices, then advance them to adjusters and finally to work as service chiefs.

Another advantage is that it is now possible to determine the time required to perform the various routines and thus gauge the efficiency of employes, whereas when everybody did everything it was practically impossible to gauge efficiency.

From the central offices of the operating companies, the good work spread into other branches of their organizations so that today some of them are beginning to use the routine method of taking care of their subscribers' stations with good results. Furthermore, the larger companies which have a number of men engaged in repair work and installation work scattered over many city blocks, control them and direct them in the work from a centrally located despatching desk. It has been found possible by the use of a competent despatcher and by keeping suitable records of performance of better trained men to double, and in some cases treble, the number of assignments which each man takes care of in the course of a day, and at the same time to see that every old subscriber and every prospective subscriber is taken care of promptly. Standardized tool and supply kits have been worked out for the repair men and in many other ways efficiency methods have been introduced.

The benefits which we have received from the good effects of this work have not all been due to the improved reputation of our apparatus for giving good service at moderate cost, but we have received two very important direct benefits; first, very close, friendly relations have been established between those who have been endeavoring to please the public with our equipment, and ourselves as manufacturers, and, second, we have learned how our apparatus might be improved to meet our customers' needs better, so that

one cannot truthfully apply to our business a statement recently made by St. Elmo Lewis, in one of his papers on the "Principles of Scientific Salesmanship" when, in speaking of the automobile truck business, he said, "Few manufacturers know anything about what their trucks are good for, nor in what lines of business they should be used. Engineering skill has not been developed around the interpretation of the customers' transportation needs, but about what the engineer has thought a truck should be as a piece of machinery. And, as usual at this stage, the customers' education has progressed more rapidly than the manufacturer's, because the manufacturer is concerned more about production than market."

As a result of this close co-operation between the companies using our apparatus and ourselves, our engineers have been both able and willing to develop a line of apparatus which can and is being operated for half the central office labor cost per annum that is required for our older apparatus, and which is more pleasing both to our customers and to their subscribers.

As shining examples of what may be accomplished where the new methods are enthusiastically and conscientiously applied to the new equipment, I will cite the exchanges in Washington Court House and Alliance, Ohio. These exchanges are in friendly rivalry for the record of running the greatest number of consecutive days without having a single subscriber's complaint due to an unstandard central office condition.

Recently the Washington Court House central office apparatus, which serves 1,600 telephones, ran for fourteen consecutive days without being the cause of a complaint, although during that period the one boy performing routines and the one man doing the other work in the office discovered and corrected per day an average of five unstandard conditions in the 74,000 springs, gears, pawls and other moving parts in the exchange.

The Alliance central office equipment, which serves 2,800 telephones, recently ran for fifteen consecutive days without being the cause of a complaint. During this period, the one young woman and the one man in the office detected and remedied per day an average of six unstandard conditions in the 133,000 moving parts of that central office equipment.

This is practically perfect telephone service given at a comparatively low cost by using competent counsel, standard practice, instructions, standards of performance, adequate records, discipline and most of the other "twelve principles" that are necessary to efficiently control conditions instead of having them control us.

I see no reason why the same thing which has been done in the automatic telephone business cannot be done in many other industries, but I believe that such co-operation and such accomplishment is rather novel, and I therefore hope that this short statement concerning it will be instructive and helpful.

Sells Car by Telephone

The easiest sale reported in a long time comes from the Velie Automobile Co. and disposed of a Biltwel six closed car in St. Louis. The first known of the prospect was when a woman called by long distance telephone. The woman purchaser told the salesman that she had ridden in a neighbor's car and liked it and that her husband had told her the Velie was all right, so if they would send a car to her home she would buy it. The deal was entirely closed in four hours.

Telephone Surgical Probe

Surgeons in the warring armies in Europe were formerly forced to spend valuable time searching for bullets with steel probes. Frequently they never knew whether the bullet was still in the body or not, and many soldiers carried the cause of their injuries about with them the rest of their lives. Once the telephone probe, however, comes in contact with the metal in the wound there can be no mistaking its presence. It is the invention of David Findlay, M. D., medical officer in charge of the electrical department, West End Hospital for Nervous Diseases, Edinburgh. It has been in use in the British army for about a year and bids fair to revolutionize army surgery.

When packed the telephone probe resembles an acousticon used by the deaf. The probe consists of a silver rod insulated from a sheath of the same material, forming two electrodes. The electrodes from the probes are attached to a plug in the box by insulated wires incased in rubber tubing. In the lid of the box are fixed the plug holder, a specially wound telephone, and a dry cell of the ordinary flashlight pattern.

When the plug is in its holder an electric current is established on inserting the probe into a wound, contact being effected through the moist surfaces. Any disturbances of the flow or interference with the lines of force of the current, such as occur when a piece of metal is touched by the probe, will be instantly indicated by a sound from the telephone.

Not only is the telephone probe of inestimable value to military surgeons, but Dr. Findlay thinks his invention should prove useful to the general practitioner as well, for needles and other small bits of metal can be located just as easily as bullets.

Modifications of Dr. Findlay's probe have already come into use. According to Dr. R. C. Conti, Junior Demonstrator of Pathology at St. Bartholomew's Hospital, London, no dry battery need be used with the telephone probe, for the skin of a patient often generates as much as a volt of electricity. Consequently, Dr. Conti suggests that the telephone probe may consist of a telephone receiver, one terminal of which may be connected with the skin of the patient by means of a flat electrode, covered with a wet cloth, the other terminal being connected with a metallic probe.

Upon the probe being introduced along the track of the bullet, contact with it or any other small piece of metal, a sound is produced in the telephone by the resistance of the current. If the area of the metallic substance is large the resistance will be low and the sound in the telephone loud. If the foreign metallic substance be small the sound in the telephone will be comparatively weak. Therefore, Dr. Conti's probe is able to indicate the size of the object causing the wound.

The United States Civil Service Commission announces an open competitive examination for assistant examiner in the Patent Office, for both men and women, on January 17, 18 and 19, 1917. From the register of eligibles resulting from this examination certification will be made to fill vacancies as they may occur in this position at the entrance salary of $1,500 a year, in the United States Patent Office, Washington, D. C., unless it is found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Clauses in Contracts and Order Blanks

Responsibility for Verbal Statements of Salesman or Agent

BY ELTON J. BUCKLEY

ALMOST every written or printed paper in the nature of a business contract, which comes to me nowadays, has a clause in it which is intended by the seller to remove his responsibility for any verbal statements which his salesman or agent may have made in making the sale. The substance of the clause is: "This paper is the entire contract, and the seller is not responsible for verbal statements made by salesmen."

So general is this practice becoming that it behooves business men more than ever today to see that they do not make purchases or contracts on verbal statements which are not incorporated in the written contract or order blank. If they do, and the paper contains the provision I have referred to, the buyer will often find the transaction wholly different from what he expected it to be.

A case has just been decided by a Southern Appeal Court which shows very clearly what I mean. A salesman went to a merchant who was in the market for a particular kind of a machine, and he represented to him that his machine would do a certain kind of work. He was not general in his remarks; he was specific, and he told in detail just what kind of work the machine would do.

The merchant believed him and placed an order, not thinking it worth while to examine the contract, to see if it contained anything which disagreed with the salesman's verbal statements. As a matter of fact, the order blank contained only the following about the work which the machine would do:—

> It is warranted to be made of good material and durable with good care, and to be capable of doing more and better work than any other machine made of equal size and proportion working under the same conditions on the same job, if properly operated by competent persons, with sufficient steam or horsepower, and the printed rules and directions of the manufacturer intelligently followed. The condition of the foregoing warranty is that if, after a trial of ten days by the purchasers operating in the manner specified, said machinery shall fail to fulfill the warranty, written notice thereof shall at once be given.

Nothing whatever here about the *specific* work which the machine would do.

Later a dispute arose over the work of the machine, the buyer claiming that it would not do what the salesman had said it would do. The seller brought suit, and the case was tried, the buyer relying upon the verbal representations of the salesman. He lost at every point. The court said in substance: There were two warranties here. The salesman's verbal representations as to what the machine would do constituted one, and the written language (reproduced above) constituted another. But the written warranty entirely superseded the verbal one, and the buyer had no right to rely upon the verbal warranty at all.

The buyer here also fell down by not notifying the seller that the machine was not satisfactory, but even if he had done that, the decision, I take it, would have been the same, viz: that the statements of the salesman were out of the case, because the written contract contained somehing inconsistent with them.

How could this buyer have saved himself? By saying to the salesman: "Here, you put what you say in the written contract that you give me."

Of course, sometimes fraud is behind these contract provisions as to the seller not being responsible for verbal understandings. Sometimes a sale will be deliberately made by false representations, the responsibility for which the seller seeks to disavow by some such clause as the above. He will not be permitted to do so, if there is fraud.

Such a case was recently decided. The seller told a lot of lies about his goods and then made his buyer sign a written contract containing the following:—

> This is the only contract made by us, and it is not to be changed or varied by any promises or representations by ourselves or other people.

The buyer soon found he had been done, but when he started to show up the seller's false representations, the latter pointed to the above clause in the contract and smiled triumphantly. The court, however, soon changed the triumph into defeat. The ruling was as follows:—

> If the seller made statements which he knew or should have known were false and thus induced the buyer to purchase, relying on such statements, the effect of such fraud cannot be overcome merely by a contract expressly omitting warranties. Because the fraud was so successful as to induce the buyer to take a contract without a warranty is all the more reason that there should be liability on the fraud.

So that where the verbal statements of a seller, or his salesman, are fraudulent, the buyer can always take advantage of them, no matter what the written contract says about it. But where they are not deliberately fraudulent, or where they are only inconsistent with the written contract, he cannot. It is very hard to prove deliberate fraud, incidentally.

(Copyright, October, 1916, by Elton J. Buckley.)

Northwestern Bell to Expand

The major share of $2,800,000, which will be spent in 1917 in the Twin Cities by the Northwestern Telephone Exchange company, will come to Minneapolis. This was learned from the announcement of C. E. Yost, president, and W. B. T. Belt, vice-president of the company, that $5,000,000 will be put out by the company this year for new construction. The expenditure is the 1917 allotment of the $10,000,000 obtained for the purpose last February when the capital stock of the company was raised from $15,000,000 to $25,000,000.

Of the amount appropriated by the Northwestern Company for Minneapolis and St. Paul the next year, about $400,000 will be spent in new buildings or additions to the 15 buildings now owned by the company in the two cities; about $900,000 will go for switchboards and central office equipment and $1,500,000 for underground construction, overhead cables, pole lines and subscribers' telephone equipment.

In Duluth the company will spend about $600,000 and in Minnesota and the two Dakotas, outside of the three large cities, about $1,550,000.

Value New Mexican Telephones

The state tax commission secretary reported on December 15 that the telephone valuation has been increased from $997,000 to $1,014,000 for 1916.

European Telephone Development

Translations from the Foreign Press and Communications from European Engineers

BY FRED W. SCHOLZ

THE question as to the principles to follow in twisting the conductors in telephone cables so as to prevent all noises and possibility of having the conversations heard on other wires has been frequently discussed and yet opinions have not yet settled down to one unanimous decision. As a rule the lay of the twist, i. e., the distance between two spirals is very short. There are methods, however, whereby the pitch of the spiral turn is changed and used longer and where the length of the lay is changed from conductor to conductor. The attempt will be made in the following study to test the two methods, namely long and short lay as also change of direction

Fig. 1. Simplest form of twisted conductors.

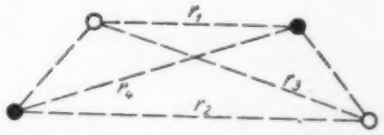


Fig. 2. Second possibility of twisting conductors.

for their value, paying special attention to the protective effect against magnetic influence from neighboring currents, against induction and electrical interference.

I. Theoretical Part: In twisted conductors, the plane passed through the two conductors rotates constantly around a straight line running in the longitudinal direction of the conductors. The angle, which the plane forms at every point with a definite plane passing through the axis, is the phase angle of the twist, the twist-phase. Between two points following close upon each other with the same twist-phase, we have the twist pass through one complete phase, which is lay of the twist.

If two double conductors lying next to each other are twisted in the same direction, with equally long lays without any irregularities, then the difference of the twist phases remains always the same. In Fig. 1 the planes passing through the two conductors of the lines for example will always form an angle of 90 degrees with each other.

With the planes the direction of the resultant field, which exists at any given moment in each of the double conductors, rotates and changes also. If we designate the coefficient of the counter or opposite inductivity of two neighboring looped conductors of length l by M and if $r_1 r_2 r_3 r_4$ are the distances of the conductors according to Fig. 2, then

$$M = 2l \ln \frac{r_3 r_4}{r_1 r_2}. \quad *)$$

The formula is true for conductors of any desirable cross section, if the measurements of the same are negligibly small as against the distance of the conductors from one another. It is valid for conductors of circular cross section if we understand by $r_1 \ldots . r_4$ the distances of the centers of the conductors from one another. The assumption made when setting up the formula, that the four conductors run permanently parallel, and that the magnitudes $r_1 \ldots . r_4$ are therefore constant, does not hold good for twisted conductors. As Fig. 1 shows, the conductors move in the twisting of wires in a circular path, are therefore inclined towards each other, the inclination increasing the shorter the lay of the twist and the greater the distance from the axis of the twist. Let us assume that the twist is in long lays, the length of the lay being chosen so great that one piece, considered long in relation to the distance between the conductors, may be assumed to be in form of a straight line and approximately parallel to the corresponding pieces of the other conductors.

The length of the lay may be a and $\frac{a}{\lambda}$ the length of a lay, which is considered as being a straight line. The opposite inductivity of the looped conductors for the straight line section will then be:

$$M_1 = 2 \frac{a}{\lambda} \ln \frac{r_3 r_4}{r_1 r_2}.$$

As the distances of the four conductors $r_1 \ldots . r_4$ are small, but not negligibly small, when compared to the length of the section of conductors observed, the formula is to be corrected to $M' = 2 \frac{a}{\lambda} \left[\ln \frac{r_3 r_4}{r_1 r_2} - \frac{\lambda^2}{8 a^2} \left\{ 3 (r_3^2 + r_4^2 - r_1^2 - r_2^2) + \frac{8 a}{\lambda} (r_3 + r_4 - r_1 - r_2) \right\} \right]$

The lengths of $r_1 \ldots . r_4$ change with a, the phase angle of the twist; they can be represented as functions of this angle. From Fig. 3 we have:

$$r_1^2 = k_1 + l_1 \cos\left(a + \frac{\varphi}{2}\right) \qquad r_2^2 = k_1 - l_1 \cos\left(a + \frac{\varphi}{2}\right)$$

and

$$\frac{r_3^2 r_4^2}{r_1^2 r_2^2} = \frac{k_2^2 - l_2^2 \sin^2\left(a + \frac{\varphi}{2}\right)}{k_1^2 - l_1^2 \cos^2\left(a + \frac{\varphi}{2}\right)}$$

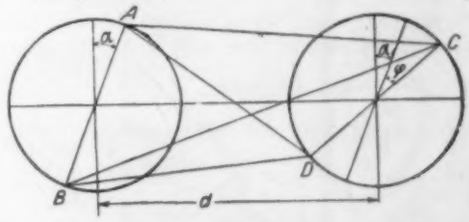


Fig. 3. Theoretical figure for twisting of cable conductors.

The above equation holds good, if the following equations are correct:

$$k_1 = d^2 + 4 R^2 \sin^2 \frac{\varphi}{2}, \qquad l_1 = 4 d R \sin \frac{\varphi}{2},$$

$$k_2 = d^2 + 4 R^2 \cos^2 \frac{\varphi}{2}, \qquad l_2 = 4 d R \cos \frac{\varphi}{2}$$

$r_1 \ldots . r_4$ can be eliminated from the above formula for M^1.

In order to obtain the coefficient for the counter inductivity of a lay, the length of the lay must be observed.

If we consider the relation $a : d\,a = 2\pi : d\,a$ where a is the length of the lay, da an infinitely small particle of a and da an infinitely small increase of the phase angle a, which increases from 0 to 2π, then we obtain for the coefficient of the counter inductivity of a lay through integration over 2π:

$$Q = 2\,a\,ln\,\frac{l_2}{l_1} + a\,ln\frac{A^2 - \sin^2\frac{\varphi}{2}}{B^2 + \cos^2\frac{\varphi}{2}} - \frac{6\,\lambda^2\,R^2}{a}\cos\varphi - 4\,\lambda$$

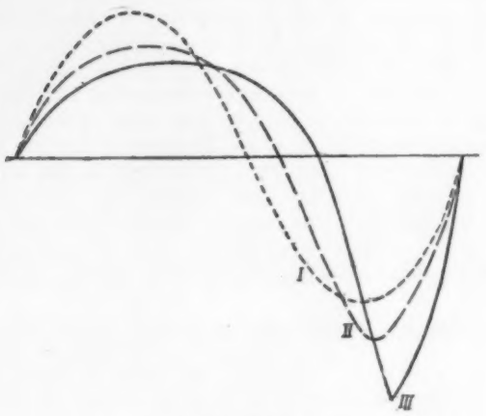


Fig. 4. I. Phase Difference 90°
II. Phase Difference 45°
III. Equal Phases.

$$\left(\sqrt{d^2 + 4\,R^2\cos^2\frac{\varphi}{2}} - \sqrt{d^2 + 4\,R^2\sin^2\frac{\varphi}{2}}\right)$$

then: $\frac{k_2}{l_2} = A$ and: $\frac{k_1}{l_1} = B$.

The counter inductivity of the two twisted conductors can under the given conditions be zero only, when the coefficient for one lay, i. e. Q is equal to zero, since all of the lays will have to add equal shares to the total effect. The individual members of the expression for Q become zero only then, when $\frac{\varphi}{2} = 45°$, $\varphi = \frac{\pi}{2}$, since $\frac{l_2}{l_1}$ according to the definition is equal to cotg. $\frac{\varphi}{2}$. In other words, two twisted conductors, laid parallel, having the same lay and being uniformly twisted are free of mutual inductions, if the two twist phases are by $\frac{\pi}{2}$ or $\frac{3\pi}{2}$ apart from each other.

Before carrying out the integration we had:

$$Q = 2\int_0^a In\frac{r_3\,r_4}{r_1\,r_2}\,da - \frac{3\,\lambda^2}{4\,a^2}\int_0^a (r_3^2 + r_4^2 - r_1^2 - r_2^2)\,d\,a$$

$$- \frac{2\,\lambda}{a}\int_0^a (r_3 + r_4 - r_1 - r_2)\,d\,a$$

What relations the magnitudes of the three members of the expression for Q have to each other, is seen when substituting certain values for any dQ. With paper cables R is nearly equal to 1 mm. (0.04 in.) and d equal 5 mm. (0.20 in.) λ is equal 20, so that the section of conductor, considered a straight line, has an inclination of $\frac{360°}{20}$ = 18 degrees, i. e. each end deviates by 9 degrees compared to the middle section. It is then with $\phi = 0$ in a position in which the induction effect is the greatest. $dQ = (0.30 - 0.0006 - 0.015)\,da$ when $a = 2000$ mm. (80 in.) when $a = 400$ mm. (16 in.) we have: $dQ = (0.30 - 0.015 - 0.08)\,da$.

We see that the magnitude of Q in long lays is determined primarily by the logarithmic member and it is of interest to follow the change of the value of this member within the lay. This can be done graphically by having the points $A\,B\,C\,D$ (Fig. 3) pass along the circles, measuring $r_1 \ldots r_4$ in the various positions then computing the values for the logarithmic expression and transfer them to the form of the curve.

The form of the curves shown in Fig. 4 for the logarithmic values differs according to the magnitude of the phase difference. If the phase difference is $\frac{\pi}{2}$ or $\frac{3\pi}{2}$ then the form of the curve is regular and uniform; if the planes of the conductors lie parallel, then the forms of the curve lying above and below the zero line vary quite little. The parts lying above and below the abscissa axis of the surfaces enclosed by the curves, which represent the integral of the inducing force, are only equal in the sine-form, i. e., if the angle of the planes is equal to $\frac{\pi}{2}$ or $\frac{3\pi}{2}$

The graphic system can also give information in several other cases, where the mathematical treatment meets greater difficulties. If the one conductor for example is twisted right, the other twisted left, then we get curves similar to those with twist in the same direction. A change in the direction of the twist in one of the conductors will therefore be without influence on the protection to be desired.

We are now going to follow out the effect of a change of twist from conductor to conductor. Fig. 5 shows how the four wires of two double conductors, which are twisted with certain lays, lie to each other. Their lengths are as 1 : 2.

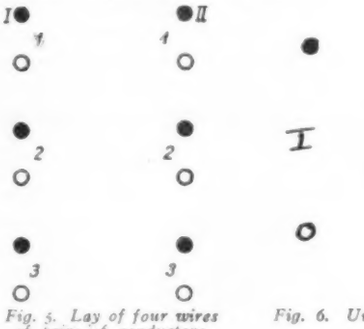


Fig. 5. Lay of four wires of pairs of conductors.

Fig. 6. Uneven position of conductors.

At the end of one lay of wire I we have the end of half a period of wire II, i e. the position of wire II to that of I is the opposite direction. In the formula for Q, r_1 and r_2 are exchanged for r_3 and r_4. The induction effects in these positions neutralize each other. This holds true of course not only for the beginnings of the various steps, but also for points lying intermediate. Two wires, whose lengths of twist are to each other as 1 :2 are therefore free of inductions and their effects. The same is easily proven for the relation 1 :4, 1 :6, etc., and for every other direct even relation.

In uneven relations of the lengths of twist to each other, it is impossible to give for each position of the conductors a similar position of opposite effect. In the ratio 1 :5, for example, the conductors lie at the end of

five steps of the shorter twist, again as at the beginning (Fig. 6). Within this cycle every position of the conductor with shorter twist repeats five times. To this belong five different positions of the conductor with longer twist. Four of these almost neutralize each other in their effects, as can be proved graphically. The induction effect of one position remains unbalanced.

In an even relation of lays of twist the curves for the logarithmic expression are again regular, in uneven relation they need not be so. It depends on the phase difference in the initial positions. If the difference is equal to $\frac{\pi}{2}$ then we have the sine-form, if there is equality of phases, then the differences from the regular form are the greatest. If we repeat the investigations with various relations of lays, then the irregularities in the most unfavorable position of the conductors are all the smaller, the greater one makes the differences in the lengths of the twist.

It is not really necessary to have the length of the larger lay a multiple of that of the smaller. If the relations of lays are as 3:4, then the twist of conductor *I* will remain behind that of *II* at every step by ¼ period. We have then the same positions as in the relation 1:4, only in another sequence. The number of cycles falling upon a certain length are much smaller, than in the relation 1:4. What importance this has, will be seen later.

The conclusions to be drawn from the preceding study may be summarized as follows:

1. With a long twist, two double conductors, lying next to each other and twisted with the same length of lay, are not always free of inductive effects, but only when the phases of twists of two points lying next to each other are displaced by 90 degrees.

2. If the lengths of the lays differ, then the inductive effect becomes less in each case, just as in the uniform twist.

3. The conductors are free of inductive effects, if the twist phase of the conductor with longer twist remains behind the phase of the other conductor at the end of each shorter twist lay by a portion of the longer period, which can be expressed by a fraction with an even denominator.

4. If the denominator of this fraction is an uneven number, then the conductors are, as we found in the twist without change, only free of inductions under certain conditions. The effect is only little larger, however, being less in proportion, as the number of the denominator of the fraction becomes greater.

In the discussion no attention was paid to irregularities in twisting. In reality the following changes will have to be accounted for:

1. The length of a lay will not always be even, even though the same twist is intended.

2. The distance of two neighboring conductors will not always be the same, i. e., not constant.

3. The cross section centers of the conductors do not move exactly in a circular path. The paper insulation will often have not a circular but rather an elliptical cross section; its stiffness may prevent the conductors from coming close together. Even the magnitude *R* would then not be constant at all time. As to *1;* according to observations made in numerous cases we must figure on fairly large deviations in lengths of lay. In a normal length of 150 mm. (6 in.) the greatest deviations of 10 mm. (0.4 in.) were found, i. e., about 7 per cent. The measurements cannot be recorded with great accuracy, owing to the lack of uniform texture of the paper covering of the conductors. Irregularities could be observed in other conductors covered with rubber insulation and twisted with very short steps. The common twisting machines will therefore give twists of more or less irregularity and variations have to be figured in all computations. As to 2; the drawbacks mentioned in 2 are hard to follow in cable measurements. The double conductors lie comparatively close against each other. The twist with which the entire layer is wound around the cable core gives the entire cable great firmness. Perhaps we might assume that the effects of deviations from the normal position neutralize each other in the general run. As to 3; the last named disadvantages will have a smaller importance in proportion as the lay of the twist is shorter. In shorter twists the two wires of the double conductor are held together with greater firmness. Greater deviations will not occur. It cannot happen, for example, as might happen with a long twist, that a double conductor forces its way through the two wires of the neighboring conductor. In general the deviations will be smaller in short twists than in long ones. As these variations do not always pass in the same direction, they might easily neutralize each other. The greater the number of deviations, the greater is the chance of neutralization. The number is greater of course with a short twist and so we have here one advantage of a short lay. In shortening the lay, one cannot go beyond a certain minimum owing to the capacity and the conductor resistance to be considered. This minimum may be conceived to be near 50-70 mm. (2-2.7 in.).

The improving effects of a change of twist could be utilized by using twists which vary quite little from one another. One of the twists would be chosen very short. The best relation is 1:2, 1:4, etc. The twists might then be:

2	4	8	in.	50—100—200 mm.
2.4	4.8	9.6	in.	60—120—240 mm.
2.8	5.6	11.2	in.	70—140—280 mm. etc.

To choose more than three different lengths would be advisable only if the inductive effect of one conductor were to extend past that of the other two and this can only be found out by measurements in telephone cables.

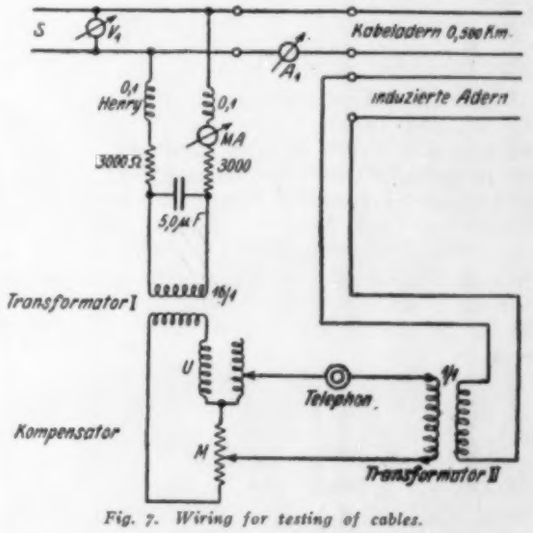


Fig. 7. Wiring for testing of cables.

II. Measurements with Paper Cables.—For measurements there were at hand four paper insulated cables each 1,650 ft. long with 150 double conductors each. The conductors of the first cable were to have a uniform lay of twist of 150 mm. (6 in.), that of the second cable one

of 75 mm. (3 in.); the conductors of the other two cables were to change the twist, the third cable changing 110, 130, 150, 170 mm. (4.4, 5.2, 6.0, 6.8 in.). For the fourth cable the lengths were not yet determined. Through measurements lengths of 300, 190, 180, 270, 210, 220 mm., etc., twist were found (12, 7.6, 7.2, 10.8, 8.4, 8.8 in.). A definite system in the arrangement could not be found. In the first three cables the measurements gave deviations from the given lays up to 7 per cent. The ends of the cables were closed with the usual caps. A testing of all the conductors with a mirror galvanometer and a battery of 110 volts for insulation and capacity showed that the electric values lay within the limits prescribed by the national telegraph and telephone standards. The insulation was not less than 500 megohm at any place and the capacity of the double conductors no more than 0.033 microfarad/km.

The cables were tested first of all in the usual way by speaking tests for noises and overhearing of conversations over neighboring wires. No transfer of conversation from one conductor to another was noted, although a large number of conductors was tested. Not all conductors were tested, however. If instead of telephone currents the currents from a high frequency generator with a strength of 15-20 milliamperes and with a frequency of $w = 5000$ were sent through the conductors, a transfer of noise from one conductor to the other was clearly discernible, varying in strength and intensity. The strength of the sounds was so low, however, that attempts to measure the induced currents seemed useless. In order to obtain measurements the induced current had to be increased. The current was now taken from an a. c. high frequency generator used for wireless telegraphy with a frequency of $w = 3400$, at 5 amperes and 150 volts tension. Attempts to measure the currents with thermoelements, with static instruments, or an oscillograph loop arranged like a vibration galvanometer gave no result. The measuring system finally used is shown in Fig. 7 and is a balancing or compensating system, whose principal constituent is a Larsen compensator.

The current strength in the compensator was kept constant for all measurements and a second test was made with the milliammeter in the branch circuit. From time to time older measurements were repeated and compared with new results. The use of the transformers was necessary in order to keep away the disturbing influence of ground capacities as much as possible. In order to avoid variations of frequencies in the generator, the latter was fed from a storage battery of large capacity. For second testing of the frequency a tuning fork was also used aside of the regular test instruments. Too strong a heating of the conductors was avoided by testing the latter only for a short time and in a regular sequence.

The first thing to be tested was, how far the influence of a current carrying conductor in the cable reached. For this purpose one conductor was connected to the generator and then the next 30 or 40 conductors were tested for the influence by the former one. The following numbers show in what relation the induced tensions were in the nearest conductors.

1.	0.24	7.	16.30
2.	0.52	8.	2.50
3.	0.55	9.	1.40
4.	2.20	10.	0.13
5.	11.30	11.	0.63
6.	inducing conductor	12.	0.32 etc.

It is clear that the conductors lying on both sides of the inducing conductor are strongest influenced, as is to be expected, and that the effects decrease with the distance from the latter.

The double conductors lie in layers over each other, the conductors of each layer being wound in spirals about the core. The direction of the twist of each layer is opposite to that in the neighboring one. With this arrangement one could hardly expect that the inducing action of one conductor would enter the field of the neighboring layer. The results of the tests bore out this expectation. In the subsequent tests only the effects of each conductor on the two neighboring ones were tested, 100 pairs of conductors being tested in each cable.

The amounts of the tensions measured lay in part very far apart. The smallest and the largest value had a relation of 0.2 to 100. The computation of an average value did not seem necessary. For each cable the tension values were arranged according to magnitude, no matter from what conductor they came. These tensions were then arranged in form of curves and are shown in Fig. 8.

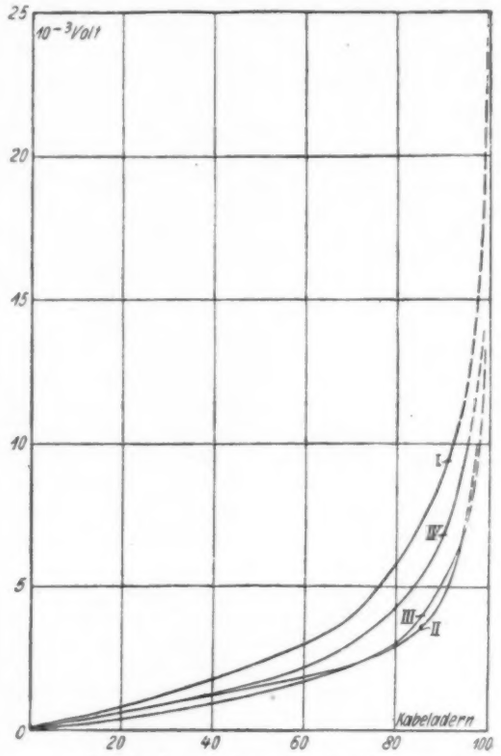


Fig. 8. Curves of tensions in cables.

These curves show that the mutual influence is lowest in the cables with twists whose lays are short and of varying length. Then follows the cable with equal short lays and next in order is the cable with changing but slightly longer lay. Least advantageous is the cable with lays of 150 mm. (6 in.). At a test of the worst cable conductors a clear transfer of conversation was noticed. In Fig. 8, cable *I* has uniform twist with long lays. Cable *II* has uniform twist with short lay; cable *III* has short lays with varying length and cable *IV* changing twist with varying length. The values measured for about 100 pairs of conductors are arranged according to magnitude. In several cables the differences in values of induced tension occurred in regular layers. The conductors of an entire layer gave good results, those of the next layer bad ones. The inductive effect increased with the frequency and the current strength.

If several bad conductors were connected in series the total inductive effect depended on the series in which the conductors were connected. If the worst pairs of a cable were connected in series, and if I*a, b;* II*a, b,* etc., were the inducing and I*a, b; 2a, b,* etc., were the induced conductors, the effects were quite different from the effects, when I*a, b* was interchanged with I*a, b* or I*a* with I*b*.

Up to this time we have figured only with magnetic induction effect. The test method used gives no idea whether the connection between the conductors is magnetic or electric, whether we have induction or influence action. In general it is assumed that the overhead noises in paper cables are due to the partial capacities that come in question and the differences between them. Perhaps this reasoning is occasioned by the fact that differences in capacity can be proved by ballistic measurements without trouble, while the amount of the coefficient of the mutual induction is not as easily determined. Since the trouble in the cables is caused by electric currents, the telephone currents, we will also have to take account of the magnetic effect. We may assume without any doubt, that conductors, which show considerable difference in symmetry of the partial capacities also influence each other magnetically, as the difference of the capacities would allow us to conclude that there are irregularities in the position of the four wires, which destroy the conditions for the freedom from inductive effects. Fig. 9 shows what partial capacities come into question.

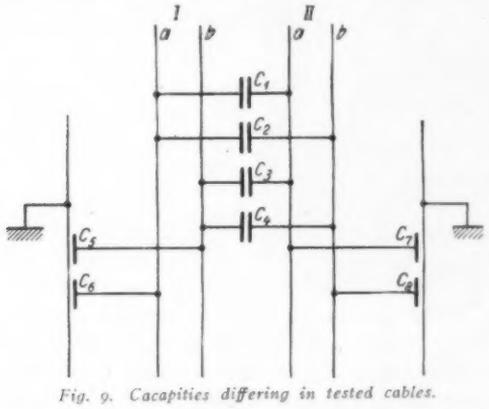


Fig. 9. Cacapities differing in tested cables.

The capacities were measured ballistically according to the well known method, charges and discharges with both poles. The following values were found at two pairs of conductors, the first of which was shown to possess a very strong inductive dependence and the second a very slight one.

	Average value of the Indication.
Ia-IIa	438
Ia-IIb	430
Ib-IIb	427
Ib-IIa	418
IIIa-IVa	423
IIIa-IVb	423
IIIb-IVb	418
IIIb-IVa	418

In cable conductors, in which the first tests gave a low inductive effect, the values of capacities were either all or in pairs fairly equal, as is seen in III and IV. On the other hand conductors with strong inductive effect did not all show the lack of symmetry found in I and II. The differences in capacities were sometimes stronger in conductors with low inductive influence than in those with stronger induction. Capacity and induction dependence on each other might not always be equally great. Both will act either in the same or in the opposite direction, they will either reinforce or weaken each other. This is obvious, when we consider that for the capacity effect not only the position of the two double conductors to each other, but also the position towards the neighboring conductors is of influence, especially if these are grounded. Of course these are only partial tests and are to be continued in the future.—*Mitteilungen des Kaiserlichen Versuchsamts.*

BAVARIAN PREPAYMENT TELEPHONES.

The Bavarian telegraph and telephone department has installed a large number of prepayment telephones which are generally used in post offices, hotels, theaters, and also temporary places such as conventions and fairs. The sides and doors are of glass and permit telling at once whether a booth is occupied or not. Two telephone directories fastened to chains are placed, one inside and out outside, of the booths. In these booths one can only get connections for local rates, however. The equipment of one of these stations is shown in Fig. 10 and described in brief as follows.

It should be noted first that when not in use a current passes permanently through the conductors represented on the figure in heavy lines. It is furnished by the battery of the exchange (24 volts), to which is opposed the electromotive force of the microphone battery at the pay station (2 volts); the return is by ground. This current of 16.10^{-3} amperes when passing over the calling relay keeps the armature stationary in the position shown in the figure.

It brings about the attraction of the armature of the locking relay of the pay toll apparatus, which results in the opening of the slot *F* of the money slide, when the money is about to be placed. The person wishing to use the apparatus places the right coin into *F*, which is shown in *P*, and through its weight brings about a break of contact. The coin will remain in this position during the entire conversation.

The contact *C* being broken, no current can pass any further over *L*, the armature of the calling relay falls back to its rest at *R* and causes the lamp *L* to light up; the electromagnet *V* releases its armature and the slot *F* is locked again. At the same time the telephone user has removed his receiver, which brings the pay station in a position ready to talk.

At the exchange the operator called from the booth places her answering plug into the break jack *J*, which causes the call lamp to go out; she then lowers her listening key and takes the number desired. She brings about communication by using the calling plug of her double cord and rings the called subscriber by placing her listening key in the call-position. When the subscriber removes his receiver, the listening key is returned to the rest position.

The conversation ended, the end is given automatically at the exchange by the return of the receiver at the pay station. In effect a current passes from the 24 volt exchange battery over the closing relay, the right 150ω coil of the repeater, the tip of the plug, the wire L_2, the hook of the pay station, the cash electromagnet (150ω) and then returns to earth across the microphone cell.

This current is not sufficient to energize the cash electromagnet, whose armature remains at rest. When the closing signal is received, the telephone operator presses her button marked "cash" and breaks the connection.

The first operation sends a current furnished by the exchange battery over the wire L_2, the switch hook of the telephone equipment, the cash electromagnet, the

ground, the microphone cell. The strength of this current suffices to attract the armature F, which starts the lower section G of the money slide, in which is found the piece of money P, near the entrance to the cash receiver. The piece falls into the latter and the contact C is again closed. Breaking of contact returns the pole of the exchange battery to L_1, the locking electromagnet is operated and the opening F is opened. Anybody who should try to use the pay station before the operator has broken the connection would not be able to do so.

What happens if the conversation does not take place? In this case the user is still at the pay station apparatus when the operator presses the button marked "cash." The pole of the exchange battery sends current over L_2 and earth to L_1. The auxiliary relay A is at once energized, its armature approaches T and a current can pass, starting from the 24 volt battery, pass the return-money electromagnet, the microphone cell and reach the other pole of the battery by way of earth. The attraction of armature R carries G above the money return slide, into which the money falls. The entire apparatus then returns to the rest position as described before. In case of a break of contact or faulty insulation in conductor L, the call lamp will light up constantly, and in case of current loss in the grounding over the same wire the lamp L signals the fact of the apparatus being out of order. In these two instances the slot F is locked and the pay station cannot be used. One operator can serve about 60 of these stations in Munich. Like these are a large number of portable pay stations that are utilized when there are some special conventions or fairs where a larger number of telephone booths are to be available. —*Annales des Telegraphes et Telephones.*

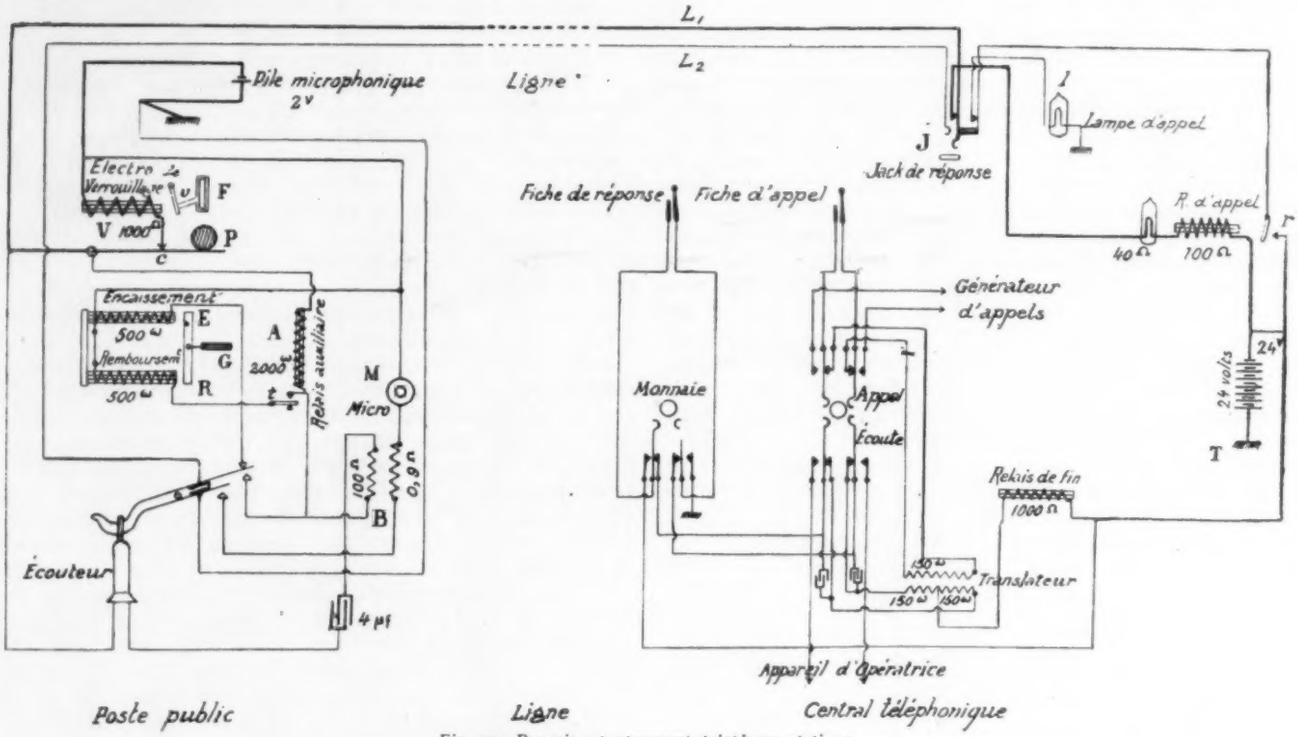


Fig. 10. Bavarian prepayment telephone stations.

Telephony in Argentina

The United River Plate Telephone Co. has been authorized by the Argentine National government to establish a branch office at Fisherton (Rosario), states *The Electrician.*

A petition for a concession for the exploitation of an automatic telephone service, presented by Mr. Alex. Schwinmer to the municipality of Buenos Ayres, has been referred by the intendency to the municipal commission. The accompanying message (from the executive department) states that the establishment of the new service proposed ought to be beneficial, as it is undoubted "that the proposed system represents great improvements over those already in use." It is recommended that a clause giving the right either to the municipality or to the national government to expropriate the service should be added to the concession. It is also stated that a similar concession is asked for by Senor Ricardo Jurado, and the executive say they "have no objection to according the concession to both or either of the applicants."

Taking the Twist Out of Flexible Cords

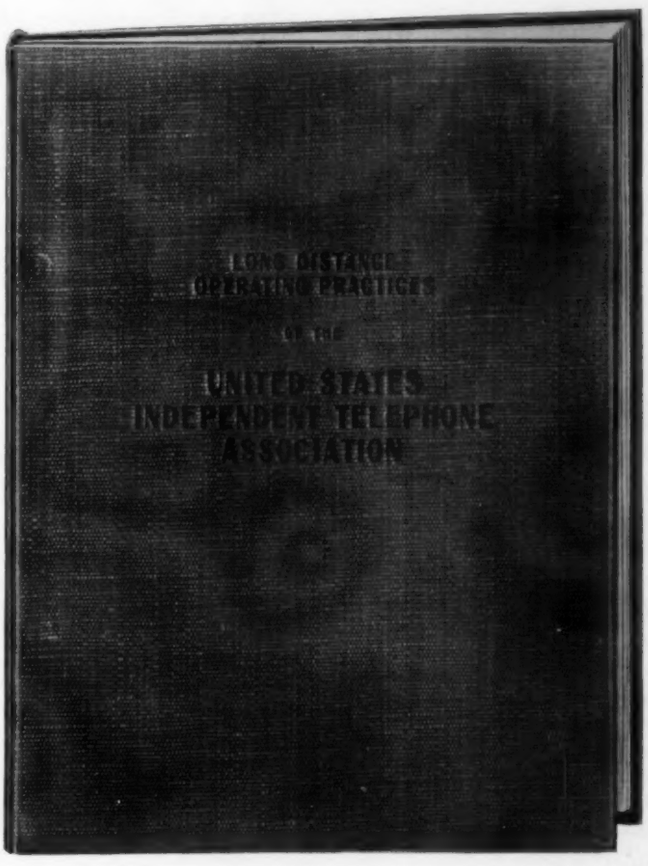
To overcome the troublesome twisting of flexible cords there has been developed a swivelling attachment that can be readily inserted into any ordinary telephone or other electrical extension cord. It consists, according to the *Scientific American,* of two small composition parts turning on a central spindle, all inclosed in two small brass shells or covers. Between the two rotating parts are two ball races that serve both as frictional bearings and as conducting means. The cord terminals are easily connected to the binding screws on each part, and there is ample room for a strain knot within each shell. The freedom of the swivelling of the two halves of the device eliminates the snarling of the cord.

Rules for Long Distance Operating

United States Independent Telephone Association's New Book Is Ready

BY SECRETARY W. S. VIVIAN

THE volume of Long Distance Operating Rules (practices) whose likeness accompanies this discription, and which is here called to the attention of every independent manager, is issued by the United States Independent Telephone Association. It is issued for the purpose of giving the Independent telephone companies the benefit of the most economical and most effective system of operation of toll lines which committees of the Association have been able to find or devise, and so far as practicable of establishing uniformity. A similar rule book of the Ohio State Telephone Company was used as a basis.



The Association's New Rule Book.

Some of the benefits of uniformity are in the saving of much time of operation and of circuits, and in making the service more prompt and attractive to the public, thereby bringing to the company more business and the ability to handle it with the utmost economy of facilities.

The Rules may well be introduced by schools of inspiration and instruction. When operators who are frequently dealing with one another over the wires are brought together in person, and, particularly in meetings, they get a much better sense of the system of which they are a part, and of their relations with one another, with the company, and with the public. They can be inspired to work with much better harmony and consideration and to learn to apply better judgment to their own particular conditions. General instructions in such schools may well be followed with individual and detailed instructions. The influence, partly conscious and partly unconscious upon uninstructed operators of those better informed and consistently using good practice will be helpful and rapid. Nothing, however, will take the place of careful, continued instruction and study. The system aims to establish practical responsibility for all acts and omissions, with usually a secondary check, or responsibility to prevent failure in the serving of the public.

It is fair to say that too few directors and managers of telephone companies have realized the importance and possibilities of the toll operators' work, because such operators, on their own initiative of learning and practice have so well developed individual effective methods. There is lack of appreciation of what can be done by systematic training and cooperation. Attention to this subject and adoption of good rules have brought many companies large financial returns and much public favor.

The Association has ordered two thousand copies of this book of which approximately fifteen hundred copies have been sold. The prices are $1.00 in quantities of less than ten; $10.00 a dozen, with special prices in larger quantities. Because of the cost of these books the Association could not tie up a large amount of money in carrying a large stock; therefore, if you have not already secured a copy for your company, or ordered, we suggest that you order a copy for every office on your system at once. If the orders received warrant our printing a larger quantity of the books, it will be done.

Books have already been forwarded to companies operating in more than thirty states of the Union. This is but one of the direct benefits which accrue to Independent telephone companies because of the United States Independent Telephone Association. There is great value in united effort, and there is no question that associated effort pays.

SUCCESSFUL OPERATORS' MEETING HELD AT BLOOMINGTON, ILLINOIS.

On Wednesday and Thursday, December 13 and 14, an Operators' Conference and School was held at Bloomington, Illinois, under the auspices of the McLean County Independent Telephone Association. B. F. Baker, the efficient secretary of the Illinois Independent Telephone Association, has the honor of being president of the McLean County Independent Telephone Association.

During the two days there were about one hundred operators in attendance from McLean and adjacent counties. Tom Ainesworth, manager of the Kinloch-Bloomington Telephone Company of Bloomington, Illinois, was host to the visitors and entertained them at luncheons both days of the conference and at a dance on the first evening.

W. S. Vivian, secretary-treasurer of the United States Independent Telephone Association, took charge the first day of the meeting and spent the greater part

of the day in reviewing and familiarizing those who were present with the new Standard Long Distance Operating Rule Book of the Association which has been adopted generally throughout the country. By means of three demonstration boards the rules were demonstrated by the operators at actual practice.

The second day of the meeting was in charge of C. E. Doolittle, traffic manager of the Citizens Independent Telephone Company of Terre Haute, Indiana, the same interests owning the Kinloch-Bloomington Telephone Company at Bloomington.

This is one of a number of schools that are to be held in the near future in different sections of the country.

FORT WAYNE, INDIANA, OPERATORS' SCHOOL.

On Thursday, December 14, local and long distance operators from north-eastern Indiana, gathered at Fort Wayne, Indiana, to receive operating instructions on the new Standard Long Distance Operating Rule Book of the United States Independent Telephone Association. The meeting was held under the auspices of the North-eastern Indiana Independent Telephone Association of which organization Martin F. Umbach, traffic manager of the Home Telephone & Telegraph Company, Fort Wayne, is president.

The visiting operators and managers were the guests of the Home Telephone & Telegraph Company at a luncheon at the Commercial Club.

Frank E. Bohn, general manager of the Home Telephone & Telegraph Company, opened the meeting and gave the visitors a warm and hearty welcome to the city. This address was in sharp contrast to the atmosphere outside the building, which was nearly zero. Mr. Bohn introduced Mr. Vivian, secretary-treasurer of the United State Independent Telephone Association, who immediately took charge of the meeting and reviewed the new book, demonstrated its worth by actual practice of the boards by means of the operators who were present. There seemed to be deep interest in the outline of the new book and a determination to master it. Much progress is noted over the operating conditions as they were in that territory prior to three years ago.

"Industrial Management"

That excellent monthly publication known for so many years as the *Engineering Magazine* has recently changed its name to *Industrial Management*, because the nature of its work has gradually evolved from the one field into the other. Engineering, in its broader sense, must embrace most of the functions of business conduct, including accounting, selection and welfare of employes, relations with the public, and several other subjects that were not until recently regarded as entering into the work of the engineer. This is particularly and peculiarly true of the public service corporations practically all of whose activities are now regarded in an engineering light.

Those topics relating to business management which, though vital to public utility success, are not peculiar to public utility operation or at least not peculiar to any one kind of public utility, cannot adequately be carried by the public service trade papers. Telephone Engineer, for example, attempts to cover the subjects of depreciation, special accounting, the employment problem and business management whenever opportunity offers. Naturally, however, there is far more good literature on this subject than a reasonable number of its pages can accommodate.

It is essential to good management that public utility operators study a wider range of subjects than is included in their direct profession. Such a publication as *Industrial Management* offers the best current thought on these subjects. Its articles are especially prepared by men of achievement in their lines, and constitute a liberal education in the field indicated by the new title of the magazine. A good example of the nature of its contents was the article on "The Principles of Depreciation Accounting," by Robert G. Klotz, which appeared in *Industrial Management* for November and was reproduced in December Telephone Engineer.

We take pleasure in recommending *Industrial Management* to all public utility managers and employes who wish to go more deeply into those specialized subjects than the trade papers can carry them. It is published at 140 Nassau street, New York.

Call Big Conference by Telephone

The telephone was used extensively to call attention to and to stimulate interest in the Central States Conference on Rail and Water Transportation in Evansville, Indiana, Thursday and Friday, December 14 and 15.

At the solicitation of the leaders of the conference, the Chicago Telephone Company and other telephone companies in the Bell system co-operated, and notified 770 persons of the conference by telephone.

Between the hours of 9 a. m. and 12 m. on December 7 the Chicago company called up 528 persons within the city, and delivered the following message:

The telephone company wishes to bring to your attention that the Central States Conference on Rail and Water Transportation will be held at Evansville, Indiana, next Thursday and Friday, the 14th and 15th instant. The civic organizations of this city have been invited to send representatives. As a public-spirited citizen we think you will be interested to see that this city is creditably represented, and we take the liberty of bringing the matter to your attention.

The same message was delivered by telephone to seventy-two persons in Joliet; sixty in Aurora, sixty in Elgin; and fifty in Waukegan.

In addition, the same message was sent out from Bell exchanges in 238 other cities.

The persons called by telephone displayed much interest, not only in the conference, but also in the spirit of co-operation shown by the telephone company in helping to arouse interest in the conference.

The purpose of the conference is to bring together representative business men of the central western states to discuss the vital questions of railway and water transportation, and hear each phase of these questions now uppermost in the public mind, presented by men of authority.

N. C. Kingsbury, vice president of the American Telephone and Telegraph Company, was one of the speakers at the conference.

Early Desk Sets

Marconi House, Strand, London, W. C.

Editor Telephone Engineer:—I have before me a copy of your November issue in which on pages 253-254, reference is made to an original desk set and it is there stated that "up to that time (1884) there was not such a thing as a desk telephone set anywhere in the wide, wide world."

This is certainly a mistake because when I joined the telephone service in London in 1881, we certainly had plenty of desk sets. They consisted of a transmitter with a bell box containing switch. These were placed back to back and mounted on a brass pedestal and connected up in the usual way by means of a flexible cord.

I fear Mr. Peters could not have got his patent in 1884.

Yours faithfully,

C. B. Clay.

Public Service Selling Methods

Adapted from a Paper By S. C. Bratton and G. D. Mantle Which Received the Gold Medal of the Pacific Coast Gas Association

THERE is one easily applied test of the efficiency of your organization—ask the man in the street what he thinks of your company. Success depends entirely upon the good relations existing between corporation and consumer.

The most remarkable development in the history of public utilities during the past decade has been, not in manufacturing methods but in the attitude of the individual companies towards their consumer. Ten years ago the adoption of "At your service" as a motto by the average company would have been little more than a poorly appreciated jest; today nearly every undertaking on the continent of North America has such a motto and endeavors to live up to it.

This development in the policy of all public service companies is almost paradoxical, for as their organizations have become more and more systematized their attitude towards the public has become more and more human with the consequence that the old opinion that any public utility company was little more than a legalized hold-up gang is giving way and it is generally becoming recognized that it is our honest endeavor to give a full dollar's worth of service for every hundred cents expended with us by the consumer.

This improved condition can be traced to the time when the company officials began to realize that the consumer was not only "No. So-and-So" but a human being whose good or bad will materially affected the figures on the annual balance sheet and who had therefore a very direct interest in the company's policy. This realization led to a closer analysis of local conditions and had two notable results: Better and fuller publicity; and the now almost universal practice of vesting the control of all public relations in one man who acts almost independently of the operating departments and whose duty it is to study all sides of the company's policy from the consumer's point of view.

CLEARING THE SOIL

His first object should be thoroughly to analyze local conditions and endeavor to remove all sources of irritation. Each subscriber's attitude towards the company is determined solely by its policy as it affects him individually and the popular feeling can only be ascertained by conversing freely and frankly with users of all classes. Many sources of dissatisfaction can be traced by carefully watching the complaint file. Unfortunately it is too frequently our custom to allow complaints to go to the complaint department for attention without attempting to analyze and use them as a means of detecting conditions which should be remedied. Every complaint means at least a momentarily dissatisfied customer and a dissatisfied customer is at the best a poor revenue producer.

Systems of classifications of complaints will readily suggest themselves. A convenient method takes the form of a monthly report compiled from a card index posted daily by the complaint clerk. Cards are printed covering generally every source of complaint and these are filed under convenient headings. As each complaint comes in it is numbered and this number is placed on the card covering that particular complaint under the date received. The monthly report shows the number of complaints under each heading during the month and an unusual number leads to a careful investigation.

Conversation with subscribers may reveal another source of irritation which is impossible to remove without the closest personal supervision and the most careful selection of employes; we refer to the attitude adopted towards the public in departments other than the new business. This attitude is rarely if ever intentional but it shows a lack of knowledge of the most elementary principles that should govern the dealings of any servant of a public utility corporation with a customer or prospective customer. It must be borne in mind at every moment and under all circumstances that the individual user is per se the public at large and is entitled to the same consideration and respect as an authorized body representing all consumers.

The most flagrant offenders in this respect are the employes of the collection and credit departments. We do not necessarily advocate any weakening of the credit or collection policy but we do urge that too close an investigation cannot be made before cutting off a customer or turning down credit and that too much diplomacy cannot be exercised when such a course is necessary. An untactful remark or harsh letter may kill in a minute the good will built up by years of good service.

It is astonishing how many means of improving the service are suggested by analyses such as these; some will cost nothing and some may require a small expenditure which will be returned a hundredfold.

Having cleared the field of all sources of irritation the next step is to prepare and fertilize the ground. To do this it will be necessary to take the public more into the company's confidence than has generally been the case hitherto and to make the man in the street feel that the company is not a body only to be dealt with because the same commodity cannot be purchased elsewhere but an institution with the public welfare, and his welfare in particular, always at heart.

A realization of this point by company officials and a systematic endeavor to gain the real friendship of every section of the community will not only redouble the returns of the new business department for the same expenditure of effort but will obtain the sympathy rather than the antagonism of the public for any contemplated change of rates or policy.

This preparation or fertilization can be accomplished in many ways, the most effective being aptly termed "Goodwill advertising," examples of which will be fresh in the minds of all.

One to which we will refer is the national magazine publicity of the American Telegraph & Telephone Company. It is not to be imagined that the expense of these advertisements was justified by the number of new connections influenced by them but there is scarcely a person in the United States who does not feel a kindlier interest in the company since reading them and who does not seriously doubt that any federally controlled organization could equal the present system.

Another example which has a slightly different purpose is the series of advertisements of the Peoples Gas Light & Coke Company in the Chicago dailies. Everyone who reads them is bound to believe that the proposed change from a candle power to heat unit basis is in the interest of the consumer—a belief which we can scarcely conceive an uninitiated public would otherwise entertain.

These two examples are merely mentioned as showing the good results that can be obtained from skillfully handled publicity of this character and there is not the slightest doubt that a regular space in the local dailies with good attractive copy describing the work the company is doing in the interest of the public is an excellent investment. This space should always occupy the same position in the paper and a distinctive lay-out used. The minimum effective space is 18 to 20 inches and the advertisements should appear not less than twice a month. Get the best man in your city to write the copy; the additional expense is negligible when compared with the results, and use different copy not only in every issue but in every paper.

Newspaper publicity though most effective is not the only way to prepare the ground. The human mind is a super-sensitive adding machine which automatically credits or debits to the goodwill account of every person or object momentary impressions, pleasant or unpleasant, made by that person or object. The senses chiefly affected are those of hearing and sight and when each employe of a company seizes every available opportunity to speak a courteous word and do a kindly action and the appearance of its offices and men are such that it is a pleasure to approach them, that company is due for a season of unprecedented prosperity.

SOWING THE SEED

The cleared and fertilized field should now be in ideal condition for the reception of the seed, in other words the implating of a desire to use the service in the minds of the people, and as "the creation of a desire to buy" is almost an ideal definition of advertising our next step is clear.

Bearing in mind this definition of the word "advertising" it will be realized that the true advertisement is more than a mere announcement of a certain article at a certain price, which will as a rule only appeal to those who already have in some measure the desire to purchase and will leave untouched the far greater public in whom as yet this wish has not been created. The ideal advertisement appeals to every reader and endeavors to create a feeling that the comfort of the reader is not complete without the article advertised.

Though advertising is not as yet, indeed never can be, an exact science it is nevertheless a science and is in fact applied psychology, supported by a mass of statistics as complete as those used by a large insurance company in determining their risk; and just as the insurance company cannot say exactly what revenue the premiums of a certain number of policy holders will produce but know that in the aggregate they will produce a profit greater than the risk covered, so the modern advertiser knows that though he cannot exactly foretell the result of a properly conducted advertising campaign, it will produce a revenue which will more than justify the expense involved.

With few exceptions the public service companies have failed to realize the value of press advertising, an omission which is doubly strange when one takes into consideration the fact that they are in a better position to profit than the ordinary dealer, as the revenue is more or less continuous and is not confined to one profit on the sale of an appliance.

The full benefit of press advertising can only be obtained by continuous effort, spasmodic announcement at infrequent intervals produce little or no results. Good copy writers are scarce and a good man is worth good money. The company therefore who delegates its advertising to the spare time of one of the clerks need not be surprised if the results are few.

The object of this paper is to stimulate interest in improved selling methods rather than to recommend any detailed policy and it is therefore not our purpose to consider the teachings of advertising. Those members however who desire to go further into the matter, will find much fascinating reading and more food for thought in Dr. Dill Scott's "Theory of Advertising" and Paul Terry Cherington's "Advertising as a Business Force."

REAPING THE HARVEST

A properly conducted advertising department will treble the efficiency of the soliciting staff. The attitude of the public will change. Instead of regarding the solicitor as a more or less unwelcome intruder, the interest created by the advertisements will suggest questions which they will be glad to have answered and the salesman is relieved of the most difficult part of his duties, that of creating interest. There is not a man whose efficiency is not impaired for the rest of the day by a rebuff at a street door and he can now devote his time to real selling; reaping where the advertisements have sown.

Increased efficiency of the advertising department does not mean that less attention need be paid to the soliciting force, rather the contrary, for conditions are changing daily. The age of generalities in salesmanship is passed and prospective customers have now to be shown exactly how they will benefit by every dollar expended.

In the old days a man who had any experience in house to house canvassing of any description was eligible to fill a vacancy on the soliciting staff and was sent out with no more preparation than a few days in the office and the information he could glean from a handbook. The results he achieved were due more to the fact that he sold a necessity than to any expert salesmanship on his part.

Today our cities are more nearly approaching saturation point. The consequence is that the service salesman of today must compare favorably in training and address with those in any line of business, and though the subject is worn threadbare it may be worth while to consider for a moment the characteristics of the good solicitor.

His dress must be immaculate from crown to toe. The worst tempered woman will hesitate to shut the door in the face of a neatly dressed competent looking man while the very house dog shows his contempt for unshaven chins, soiled linen and baggy trousers.

Every woman is queen of the kingdom bounded by the four walls of her home and every man a king—when the queen is out. They therefore expect the greatest courtesy whatever their own attitude.

Stories of poor service must be listened to patiently and misunderstanding explained. Legitimate complaints should be at once reported to the office. More ill feeling is caused by the negligence of employes to report grievances after being requested to do so than by the actual source of complaint.

Control of temper should be a self-evident necessity

in every salesman, yet frequently one salesman will remark to another that he had to tell so and so "where to head in"—but we have never noticed so and so's order on the salesman's report sheet.

The salesman who does not believe in, and would not himself use, the service he sells, had better change his line of business; he may have the finest arguments in the world but unless his heart is behind his tongue the punch is lacking and a man with fewer wits but full belief will secure double the business.

Every solicitor should have at his finger tips the addresses in his district at which each class of service is operating satisfactorily and the average monthly bill. He should also be posted on cases of unsatisfactory operation and the reason for the customer's dissatisfaction.

In addition to the regular solicitors every employe who comes in contact with the public is a salesman in potential and should receive a training which will enable him to talk intelligently and give rough comparative figures.

How can all this training be given without making serious inroads on the time of both manager and men? In the authors' case a system of bulletins has been the best answer to this question. These bulletins cover the company's credit policy, instructions on writing up orders, and short non-technical articles.

Each solicitor is provided with a binder in which to keep his bulletins which are conveniently numbered and replaced as they become obsolete. No excuse is accepted for lack of knowledge of any information contained in a bulletin and the consequence is that every man is instantly alive to a change of policy or rates and is at once conversant with the comparative advantages and costs.

At the time each bulletin is issued to a solicitor an abbreviated form written in a non-technical manner is sent to every employe whose work brings him into contact with the public and is filed by him in his binder. The sales manager, or one of the specializing solicitors also attends the monthly meeting of the other departments and answers any questions arising from bulletins issued during the month. Credit is given to each employe who turns in a prospect form leading to an order and much friendly rivalry results.

The greatest factor in building up a successful sales force still remains to be considered—enthusiasm. Without this, personality and training go for naught. If the men feel that the sales manager is a friend deeply interested in their success and welfare not only during but after office hours, if they can feel that he is there to guide and not to chide and if no trouble is too great to make a doubtful point clear enthusiasm is bound to result

As already stated, our object has been to create thought rather than to recommend any definite sales policy and we believe that the sales manager whose efforts are based on the principles which we have endeavored to outline will benefit far more than if it had been in our power to suggest means whereby a record number of subscribers could have been obtained in a series of isolated campaigns.

Antigo Exchange Changes Hands Rapidly

A deal was consummated December 8, 1916, whereby four directors of the Antigo (Wisconsin) Telephone Company, Judge T. W. Hogan, Edward Cleary, J. C. Lewis and W. H. Brown, disposed of their stock to L. L. Gibbs, the remaining director and stockholder. The sale gave Mr. Gibbs entire control of the organization.

Mr. Gibbs then informed *The Antigo Journal* of that city that there would be no particular change in the management of the affairs of the company and every effort would be made to give the best of service.

An announcement was then made at Sheboygan, Wisconsin, three days later, December 11, that Eugene A. Zundell, president of the Crocker Chair Company, has purchased the capital stock of the Antigo Telephone Company, and that Walter J. Gallon, for eight years manager of the Citizens' Telephone Exchange of Sheboygan, would, on January 1, become general manager of the Antigo plant. Mr. Zundell will be the president of the new company, J. E. Collins of Antigo, vice-president and secretary, and Walter J. Gallon, treasurer and general manager.

Chicago's Telephone Progress

"Regarding matters of interest in the local telephone field," said B. E. Sunny, president of the Chicago Telephone Company, "there has been an increase in the number of telephones in Chicago, and suburbs of 11.28 per cent between December 26, 1915, and December 26, 1916, and 11 per cent increase in this connection means that over 55,000 telephones have been added to the Chicago system during the year just coming to a close. Telephones in service on December 26, 1915, and December 26, 1916, numbered 503,462 and 558,874, respectively; increase over 1915, 55,412.

"In keeping with this large increase in the number of telephones, the traffic has increased in a marked degree. On the two busy days before Christmas in 1915 the total number of calls handled each day was 2,547,000. In 1916 the two busy days preceding Christmas averaged 2,960,600 calls each, an increase of 413,600 calls, or 16 per cent. On the two days immediately following Christmas, when the traffic had returned to normal, the 1915 record showed an average of 2,238,800 calls per day, while in 1916 there were 2,542,100 per day, an increase of 303,300, or 13 per cent.

"The telephone traffic in Chicago's business center is increasing so rapidly that constant additions to equipment have made necessary the construction of a new building on the south side of Washington street, between Franklin and Market streets. When completed this building will accommodate the following exchanges of the Chicago Telephone Company which are now scattered over the loop district; Main, Central, Franklin and Randolph, and eventually Toll and the Long Lines service.

"The Chicago Telephone Company distributed about $600,000 among its employes at the first of the year. This is to enable them to meet the high cost of necessaries and will not take the place of regular increases in salaries to those in line for promotions.

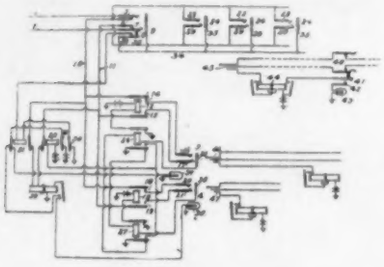
"The foremost achievements in the field of long-distance telephony during the year 1916 occurred June 14, when simultaneous and continuous communication was maintained between thirty-five cities during a nation-wide meeting of the Massachusetts Institute of Technology. The most distant cities were 4,850 miles apart (Seattle and New Orleans); they were connected by 74,532 miles of wire, along 16,429 miles of poles and through 460 miles of underground cable, and 4,815 alumni and guests of the M. I. T. put motions, passed resolutions, sang and conversed and cheered just as intimately and sociably as if they had been together in one great meeting."

Telephone Patents Issued Recently

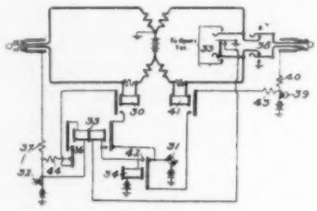
A Brief Digest of those Current Specifications Most Interesting to Telephone Men

BY DAVID S. HULFISH

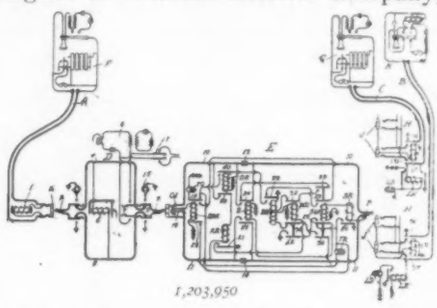
NO. 1,203,166. Automatic Telephone System. Issued to B. D. Willis, assignor to Automatic Electric Company, Chicago, Ill. In an automatic exchange where an operator is required to call for the deposit of coins in a coin box it is evident that if the called party does not answer the call the operator will not be needed upon the connection. This patent discloses apparatus and circuits whereby a calling subscriber may complete a call and the called subscriber may answer, the act of answering also acting to call an operator in upon the connection; the operator then has power to separate the two subscribers and to talk with either alone.



1,203,407



1,203,742



1,203,950

1,203,325, 1,203,326, and 1,205,618. Telephone Relay and Circuit. Issued to E. Grissinger, assignor to American Telephone & Telegraph Company, New York. (Application filed April 27, 1910.) The voice relay is of the type having variable resistance controlled by an armature, special adjusting means being provided. The circuit provides a differential feature with adjustable resistance to avoid back-transmission or howling.

1,203,336. Trunking System. Issued to E. E. Hinrichsen, assignor to Western Electric Company, Inc., New York. A manual operator to reach a distant small exchange may select a trunk line running to some convenient intermediate exchange and by a selecting key operate automatic switches at the intermediate exchange to extend the trunk line to the desired distant exchange. An economy in trunks in a large manual district is made possible.

1,203,407. Switchboard System. Issued to A. E. Reinke, assignor to Western Electric Company, Inc., New York. Duplicate answering jacks are provided upon a manual board, with a relay for each jack, operating to cut the line off from the other answering jacks when it is answered at any jack.

1,203,742. Signal System. Issued to L. H. Johnson, assignor to Western Electric Company, Inc., New York. In a common-battery lamp-signal cord-pair, when the calling party flashes once a commutator is cut into circuit with his lamp and the lamp continues flashing until the ringing key has been operated again.

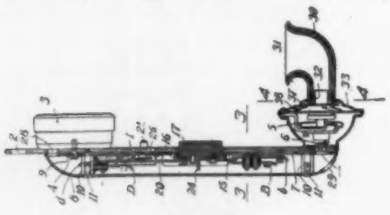
1,203,851. Relay Register System. Issued to E. H. Clark, assignor to Western Electric Company, Inc., New York, N. Y. A signal from an automatic call sender is registered upon a train of relays, in which each impulse actuates one relay and places the next relay in condition for actuation.

1,203,887. Automatic Ringing System. Issued to A. E. Lundell, assignor to Western Electric Company, Inc., New York, N. Y. A two-party line in an automatic telephone exchange is rung through a ringing-selecting relay, the current selected for the call being dependent upon the charged or uncharged condition of the ringing-selecting relay.

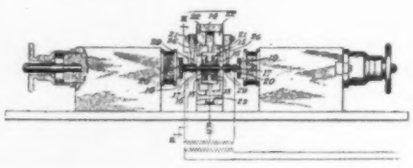
1,203,950. Trunk Circuit. Issued to C. S. Winston, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. The trunk, intended for use from the tollboard of an exchange to a local board which serves both common battery lines and magneto lines, will feed battery to the called line (or not) according as a control relay connected to the sleeve of the line jack receives proper current for operation, or not.

1,204,399. Lockout System. Issued to Joseph W. Bowley, Simpson, Sask., Canada. At each telephone, a relay for cutting the telephone from the line wires may be operated from other stations, and a signal is display showing at all times whether the relay has ben operated.

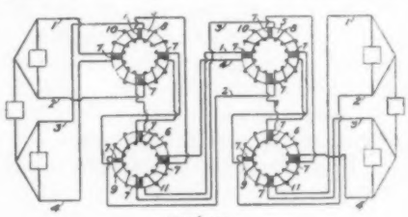
1,204,466. Automatic Power Switch System. Issued to J. L. McQuarrie, assignor to Western Electric Company, Inc., New York, N. Y. Several automatic switches are so arranged that but one operating magnet is required for all of them, the magnet being shifted to the switch next to be operated.



1,204,765



1,205,618



1,206,524

1,204,765. Hand-Microphone. Issued to W. W. Henry, assignor to S. H. Couch Company, Inc., Atlantic, Mass. A hand-microphone set is conveniently made by mounting the receiver and transmitter upon

the same side of a flat strip as a base plate, then mounting all operating switches and auxiliary parts upon the other side of the plate; then covering the latter parts with a tubular cover to form a handle grip.

1,204,783. Automatic Telephone System. Issued to L. D. Kellogg, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. (Application filed November 27, 1906.) In a system where a manual board may call an automatic subscriber by means of an automatic switch, and where an automatic telephone may call the manual switchboard by means of an automatic switch, the switches are so arranged as to be interchangeable and any switch may be used for calling in either direction.

1,204,884. Semi-Automatic Calling Device. Issued to A. Kneisel, assignor to James R. Garfield, trustee, Cleveland, Ohio. In the key-bank call sender of a semi-automatic exchange, all keys are restored to normal when a line is connected first to the key-bank for service.

1,205,499. Automatic Trunk Indicator. Issued to J. L. Wright, assignor to J. R. Garfield, trustee, Cleveland, Ohio. A trunk circuit between two manual exchanges has an indicator for directory numbers which is set from the originating end of the trunk, thus avoiding the use of the customary order wire.

1,205,518. Signaling System. Issued to E. B. Craft and J. N. Reynolds, assignors to Western Electric Company, Inc., New York, N. Y. In a semi-automatic exchange where the calling line searches for an idle operator, each line carries a characteristic signal advising the operator as to the character of the line, whether coin, flat rate, etc. In this patent, this signal system is worked out for the Western Electric type of power-driven automatic selector switch.

1,205,536. Automatic Switch. Issued to G. H. Heydt, assignor to Western Electric Company, Inc., New York, N. Y. In a selecting switch, the contact tags are arranged in straight-line rows, and the brush upon a rotating shaft is arranged to vary its radical distance to follow the tags of the straight row.

1,205,538. Trunking System. Issued to E. E. Hinrichsen, assignor to Western Electric Company, Inc., New York, N. Y. The manual operator uses a call-wire in connection with a trunk to a central exchange, and by the identity of the operated call-button the trunk is extended to a desired branch exchange and the call-wire also is extended to the same destination.

1,205,617. Call Finding System. Issued to C. L. Goodrum, assignor to Western Electric Company, Inc., New York. In a call-finder system, when several calls are made simultaneously, several linefinders are started to pick up the several calls.

1,205,700. Relay Linefinder. Issued to G. A. Betulander and N. G. Palmgren, assignors to Betulander Automatic Telephone Company, Ltd., London, England. This development in the all-relay automatic system has a relay linefinder to find a calling line, a relay being provided for each selective position of the linefinder, and a master relay operating to prevent double operation of the selecting relays on a single call.

1,205,943. Trunkfinder System. Issued to A. H. Dyson, assignor to Kellogg Switchboard & Supply Company, Chicago, Ill. Each line has spring-restored trunkfinder switch; a line relay operates the switch to find an idle trunk; the cut-off relay mechanically releases the switch when the cut-off relay is demagnetized at the end of a connection.

1,206,524. Phantom Loading System. Issued to William Fondiller, assignor to Western Electric Company, Inc., New York. The loading coils upon a phantom line are placed in pairs, and at each pair of coils the phantom circuit is loaded by flux wholly within the coils, while the physical circuits are loaded by flux from coil to coil.

1,206,761. Ringing System. Issued to R. C. M. Hastings, assignor to International Telephone Company, Columbus, Ohio. A local ringing circuit at the telephone is used. By the insertion of the plug in the jack the ringing circuit is caused to be closed, and it is interrupted when the receiver is lifted.

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

Georgia

The state railroad commission at Atlanta held a hearing on the petition of the Marshallville Telephone Company for authority to increase its rates. The company proposes to install a 24-hour service instead of the present daytime service and asks permission to increase its charges from $1.50 per month for residence telephones to $1.75 and from $2 per month for business telephones to $2.25.

Illinois

Commissioner Yates in the Central Union case at Peoria indicated that the Bell Telephone Company might well introduce more direct testimony to uphold its claim for the big rental charged the local company.

He rapped the practice of the Bell company in bringing witnesses from distant points and intimated he would endeavor to subpoena Central Union officials.

The telephone hearing will be resumed in Chicago, January 9. The Bell company, which has already used ten days to substantiate its claim for 4½ per cent of the gross income for the rental of receivers and transmitters to the local company, will occupy three more days with evidence on this point. But four witnesses have been heard.

The city of Peoria is seeking to show that this rental, amounting to $14,000 a year, is excessive, since the Bell patents have long since expired.

"I do not see any reason why an order of court directing the receivers not to participate in this hearing should deprive us of the Central Union men who know just exactly what has been done," said Commissioner Yates in his ruling.

The telephone hearing has occupied over a month so far.

Interstate Commerce Commission

At a general session of the Interstate Commerce Commission, held at its office in Washington, D. C., on November 24. 1916.

It ordered in the matter of annual reports under section 20 of the "Act to Regulate Commere," that all common carriers subject to the provisions of the act to regulate commerce, as amended, and the owners of all railroads engaged in interstate commerce as therein defined, be, and they are hereby, required hereafter to file in the office of the commission on or before the 31st day of March in each year, reports covering the period of twelve months ending with the thirty-first day of December preceding said date, giving the particulars heretofore called for in the annual reports required by the commission of said carriers and owners of railroads.

George B. McGinty,
Secretary.

Minnesota

In the matter of the application of the Northwestern Telephone Exchange Company for permission to purchase the Bloomington and Savage exchanges from the Shakopee Telephone Company:—

Application having been filed by the Northwestern Telephone Exchange Company for authority to purchase the Bloomington and Savage exchanges from the Shakopee Telephone Company, in which it is alleged that the petitioner desires to purchase and the Shakopee Telephone Company desires to sell those exchanges for the reason that the condition of the plant is such at this time that a considerable expenditure is necessary to place it in condition for economical and satisfactory operation and that the public interest will be benefitted by such transaction.

It was therefore ordered, that a hearing in the above entitled matter be held before the commission at its office in the state capitol, St. Paul, Ramsey county, Minnesota, on Tuesday, December 19, 1916, at 10:00 o'clock in the forenoon of said day and that all parties interested might appear at such time and give evidence for or against the granting of said application. Notice of hearing was given by serving a copy thereof by mail upon the officers of said telephone companies.

In the matter of the application of the Tri-State Telephone & Telegraph Company to purchase the physical properties of the Minnesota Telephone Company:—

This case was duly heard by Telephone Supervisor J. W. Howatt, on November 24, 1916. C. B. Randall representing the Tri-State Telephone & Telegraph Company as its secretary, and the Minnesota Telephone Company as its treasurer.

The Tri-State Telephone & Telegraph Company is a corporation engaged in the conduct of a general telephone business throughout the state. The Minnesota Telephone Company is a corporation operating local exchanges at Onamia, Waukon and Brainerd, together with a toll line from Opstad and Waukon to Onamia and Brainerd. The Tri-State Telephone & Telegraph Company on July 1, 1915, owned 436 shares of the capital stock of the Minnesota Telephone Company of a total of 590 shares outstanding. Since that date it has purchased additional shares so that it now owns 567 of the 590 outstanding. The par value of the stock is $25.00 per share. The stockholders of the Minnesota Company held a meeting at the office of the company in Brainerd, Minnesota, on August 18, 1916, and at that time authorized the sale of its properties to the Tri-State Telephone & Telegraph Company. There were no shares represented at this meeting outside of the stock owned by the Tri-State Company, although all of the stockholders with the exception of three or four, whose address was unknown, had personal notice. The Minnesota Telephone Company has never paid any dividends, and is indebted to the Tri-State Company to the extent of approximately $61,000. The total value of its property does not exceed $68,000. In consideration of this sale, the Tri-State Telephone & Telegraph Company will deliver to the Minnesota Telephone Company, 737 shares of the par value at $10.00 per share of the preferred stock of the Tri-State Company, and assumes all of the indebtedness of the Minnesota Telephone Company. With the exception of the Brainerd exchange, the property of the Minnesota Telephone Company is not in good condition and the consolidation of the two companies will result in improvement of its property and also improve the service to the patrons of that company.

It is therefore ordered, that the Tri-State Telephone & Telegraph Company, a corporation, be, and at the same time is hereby permitted to purchase all of the property, capital stock, bonds and other obligations of the Minnesota Telephone Company.

In the matter of the petition of Dr. P. D. Whyte, Hardwick Drug Company, Farmers State Bank, J. P. Kennedy, and forty others for telephone service in the depot of the Chicago, Rock Island & Pacific Railway Company at Hardwick, Minnesota.

Mr. Howatt, supervisor of telephones, states he is directed to advise the petitioners that in answer to the complaint in the above matter that the Chicago, Rock Island & Pacific Railway Company has advised that it will have a telephone installed in its depot at Hardwick as soon as possible.

This action on the part of the railway company satisfies the complaint and further proceedings in this case are therefore dismissed.

In the matter of the petition of Foss & Anderson, E. Dybing, Shelley Hardware & Implement Co., O. O. Odegaard, and 71 others, for telephone service in the depot of the Great Northern Railway Company at Shelly, Minnesota.

Mr. Howett is directed to advise the petitioners that in answer to the complaint in the above matter, the Great Northern Railway Company has advised the commission that it will have a telephone installed in its depot at Shelly as soon as possible.

Proceedings are therefore dismissed.

In the matter of the petition of Ole J. Berg, Peter Hoplin, A. M. Giesler, C. G. Rosengren, and twenty-eight others, for telephone service in the depot of the Great Northern Railway Company at Brandon, Minnesota.

Mr. Howett directed to advise the petitioners that in answer to the complaint in the above matter, that the Great Northern Railway Company have advised the commission that they will have a telephone in-

stalled in its depot at Brandon as soon as possible. This action on the part of the railway company satisfies the complaint and further proceedings are therefore dismissed.

In the matter of the petition of the Garfield State Bank, Garfield Lumber Company, John A. Nelson, Theo. Walstad and 78 others, for telephone service in the depot of the Great Northern Railway Company, at Garfield, Minnesota.

Mr. Howatt is directed to advise the petitioners that in answer to the complaint in the above matter, the Great Northern Railway Company has advised the commission that it will have a telephone installed in its depot at Garfield, Minnesota, as soon as possible.

Proceedings in the above matter are therefore dismissed.

In the matter of the petition of L. Cizek, John J. Janousek, B. Berrington, C. Farwick, and 24 others, for telephone service in the depot of the Great Northern Railway Company at Browerville, Minnesota.

The Great Northern Railway Company has advised the commission that it has ordered a telephone to be installed in its depot at Browerville, Minnesota.

The state railroad commission has ordered a slight reduction in short line telephone rates. The former standard minimum rate was 20 cents for distances from 9 to 17 miles. Under the new schedule, a 15-cent rate is established for distances up to 12 miles, the old 20-cent rate remaining in effect on hauls between 12 and 17 miles. Every exchange and every town in Minnesota directly connected with either company is affected and consequently all of their patrons are benefited. The commission says the new rates may not be as low as they ought to be, but are in the right direction.

In the matter of the application of the Walker Telephone Company to increase its rates for residence telephone service:—

This case was duly heard before Telephone Supervisor J. W. Howatt, at Walker, Minnesota, September 15, 1916.

C. E. Griffith, president; Charles Kinkele, secretary-treasurer; Geo. E. Crow, manager, of the Walker Telephone Company, appeared, and Dr. Frank L. Wilcox, a subscriber.

The applicant desires to increase its residence rates from $1.00 to $1.50 per month, and introduce a new two-party line residence rate at $1.25 a month, in order to obtain sufficient revenue to permit it to furnish twenty-four hour service.

At the present time service is given from 7:00 a. m. to 9:00 p. m.

Walker is a village of about 1,000 inhabitants, contiguous to Leech Lake, a prominent summer resort, and to the Walker Sanatarium for consumptives.

Notice of hearing was given by publication in the local paper, but only one citizen, besides the officers of the company, appeared in behalf of the night service.

The company claims that the continuous twenty-four hour service would require an additional expense for an extra operator, light and heat, amounting to about $40.00 per month. The increased revenue from the proposed rates will amount to about $32.50 per month.

At the present time the company is serving a total of ninety-two (92) stations, classified as follows:

25 individual line business stations, regular rate $2.50 per month.
65 individual line residence stations, regular rate $1.00 per month.
2 extension stations, regular rate 50c per month.

The company was organized in 1905 with a total capital stock of $3,100.00, all of which was paid in. At no time has it paid any salaries to the officers or manager, these persons having received their compensation from the dividends upon the stock. Dividends have been paid annually since 1906, as follows:

1905, $2.50 per share.
1906, 2.75 per share.
1907, 6.00 per share.
1908, 2.00 per share.
1909, 6.50 per share.
1910, 2.00 per share.
1911, 6.00 per share.
1912, 3.00 per share.
1913, 2.00 per share.
1914, 2.00 per share.
1915, 2.00 per share.

Or a total for the ten years of $36.75 per share on an investment of $25.00 per share; or in other words the cash dividends for the ten-year period amounts to $4,221.00 or 136.16 per cent upon a capital stock of $3,100.00.

During this same period various sums have been taken from the earnings for maintenance, additions and betterments, but the record does not show the amount or what part has been used for maintenance and what part for additions and betterments. No reserve for depreciation has been set aside.

During the year 1916 the company changed the system from grounded common return to full metallic, and made other general improvements at a total cost of $3,355.24. Eighty-eight shares of stock at a par value of $25.00 per share were sold, thus raising $2,200.00. A 70% stock dividend of 108 shares, at a par value of $2,700.00 was issued to the stockholders to cover excess earnings which they claim to have been used for extensions and improvements, so at the present time the total outstanding stock is $9,100.00, and the company claims the plant is worth $9,000.00. No testimony as to the value of the plant was offered by the company, but our supervisor of telephones is of the opinion that the plant is not worth to exceed $4,500.00. The plant has been rebuilt at a time when all material is high.

On a basis of the proposed rates and expenses the earnings of the telephone company would be.$2,508.00
expenses 1,644.00

leaving a net in come of .....$ 864.00
for depreciation, return and surplus, which amounts to practically 19% of an assumed valuation of $4,500.00.

The testimony indicates that offices of doctors, lawyers and real estate men are given individual line service at a lower rate than is being charged to mercantile or other business establishments, because they have less use for the telephone. The Commission is of the opinion that the office of a doctor, lawyer, or a real estate firm is a place of business and that they should pay the same rate as mercantile or other business establishments, and that furnishing telephone service to the former classes of business at preferential rates is a discrimination which should be discontinued.

From a review of the testimony the commission is of the opinion that the application for an increase of 50% in the residence rate is not justified, and the same is denied. Possibly the patrons

should have twenty-four hour service, but it does appear that the company is in a position to give it under the present rates.

Massachusetts

Arrangements of the New England Telephone & Telegraph Company for the purchase of telephone supplies and equipment were discussed before the Public Service Commission in a public hearing December 13. The hearing was on the petition of Charles H. Porter of Newton, who contended that the telephone company could save money and, therefore, could afford to reduce rates for service, if it would purchase equipment in the open market with competitive bidding.

When called upon to state his case, however, Mr. Porter said that he had no evidence to offer and on personal knowledge of the telephone business. The commission had received several telegrams from Independent manufacturers of telephone equipment stating that they could furnish equipment at prices as low as those of the Western Electric Company, from which latter the telephone company purchases all supplies and equipment. There were no representatives of Independent companies on hand.

Vice-President E. K. Hall, for the New England Company, spoke briefly in defense of the methods of his company. "The first cost of telephone equipment is not the most important consideration in purchasing for a large telephone system," he said. "It is of prime importance that a continuous and adequate supply be always available. Equipment must be standardized and delivery must be guaranteed. The Western Electric Company is owned by the American Bell Telephone Company."

Commissioner Eastman asked if the affairs of the Western Electric are subject to supervision by any public authority, and Mr. Hall answered in the negative. Chairman MacLeod inquired whether the Western Electric Company would produce its books for inspection, in the event of a public investigation of the affairs of the New England Telephone Company.

Mr. Hall said that he could not speak for the Western Electric Company, but that he felt sure it would give any public board whatever information was desired. "The development of telephony is due in a large measure to the work done in the laboratories of the American Bell Company and the Western Electric Company," Mr. Hall declared.

The hearing was closed.

Nebraska

The state railway commission has authorized the Kearney Telephone Company to issue a mortgage to secure an issue of $90,000 of 6 per cent twenty-year bonds and to sell $80,000 only of such bonds at not less than 96 cents on the dollar. The company is authorized to use the proceeds of the sale to refund $40,000 of outstanding bonds, to pay $26,000 of current bills payable, and $14,000 cost of additions and betterments.

New York

The Public Service Commission has given permission to the Rochester Telephone Company to issue $50,000 capital stock at par. The money derived from the sale of the stock is to be used for the cancellation of a debt of $20,000, to pay for improvements amounting to $20,500 and to construct a new telephone exchange building to cost $9,500.

Ohio

The deposition of D. A. Cleveland, Thomas Drage, Chief of Police E. J. Stankard, Fire Chief W. N. Bates, Miss Meyers, Mrs. Parsh, Florence Walton and Attorney H. W. Ingersoll were placed before the public utities commission at Columbus Tuesday, December 19, when charge of exorbitant rates and poor services against the Elyria Telephone Co. was heard.

Oregon

The public service commission fixed Thursday, December 28, as the date of hearing in the suit of the Tillamook County Mutual Telephone Company against the Pacific Telephone and Telegraph Company. The plaintiff charges that the defendant would not interchange service and that this constitutes discrimination. The hearing was held in the Tillamook county court house at Tillamook City.

Pennsylvania

The stand of the Pennsylvania Public Service Commission against useless competition in public utilities, which has been set forth several times in opinions in the last month, was elaborated in a decision handed down December 15 by Commissioner John S. Rilling, refusing to approve two telephone extensions in Perry county. The commission, he says, has adopted a policy which will lead to an improvement in telephone service, and he holds out the hope that it is only a question of time until the burden of paying for two telephone systems will be done away with and there will be no duplication. The power of the commission will see that the charges are equitable.

The decision was given in what is considered to be a typical case. The Perry Telephone and Telegraph Company sought to extend lines from Bloomfield to Liverpool and from Newport to Millerstown, in Perry, Cumberland, Dauphin, Juniata and Franklin counties. The Cumberland Valley Company protested and contended that it was already serving the territory. The commission holds that the Cumberland Valley had the right to protest and upholds its protest on the ground that further competition would be burdensome.

"The general policy of this commission is against the duplication of facilities of public utilities in the same district unless they are necessary for the accommodation, convenience or safety of the public therein," says Mr. Rilling. "The policy of telephone regulation by the commission will ultimately lead to great improvement. It makes it incumbent upon every company so to maintain its facilities and to furnish such service that intercommunication with other companies can be made properly, and in this way the telephone service in the state will be brought to a high degree of efficiency.

"It is most unfortunate that the present existing competitive conditions in telephone service exist or ever were permitted to be created in our state. In many of our communities the public is bearing the burden and suffering the inconvenience and annoyance of two telephone systems. A divided service is offered and many are obliged to pay a rental to each company; two pole lines obstruct and disfigure the streets and the duplication of the necessary wires is an added danger.

"To permit the extension of the lines of one telephone company into the territory served by another as is

asked in this case, can result only in inconvenience and annoyance to the patrons of both, and in the end will affect the service of both companies. The time soon will come when one will give way, as the patience and endurance of the public, long suffering though it may be, will not permit itself to be imposed upon by a duplication of telephone systems."

Mr. Rilling refers to the policy adopted by the commission "whereby unnecessary and useless competition should be prevented," and says it is based on "sound reasoning."

The Pennsylvania Public Service Commission, in an opinion by Commissioner John S. Rilling refusing to grant two extensions asked by the Perry Telephone and Telegraph Company, made known that the general policy of the commission is opposed to the duplication of public utilities in the same districts unless they are necessary for the accommodation, convenience or safety of the public. The Perry company had asked the approval of 13 extensions in Perry, Cumberland, Dauphin, Juniata and Franklin counties, and the Cumberland Valley Telephone Company objected to two of them, claiming it was already adequately serving the communities.

Wisconsin

A hearing was held at the municipal court room, Ripon, Wisconsin, December 16, by the railroad commission in reference to the extention of telephone lines north of the city. It appears that the Ripon United Telephone companies desire to extend their service in that direction and the Berlin company objects to the project as an encroachment on its territory. S. M. Pedrick appeared for the local company and the manager of the Berlin company presented their view of the cast.

The Wisconsin Telephone Company has recently completed another circuit covering the Maple Ridge district.

The local telephone company's cable was damaged from the blasting in the water main trenches and it was obliged to call on the Bell company for its cablemen to come and repair the damage.

Telephone Operators on the British Front

While telephone operators in the trenches at the front in Europe are seldom in the limelight, their services are of vital importance in up-to-date warfare, and well do they perform them, says the Boston *Transcript*. A party of telephone operators, or signalers as they are technically known, is attached to a company occupying a front-line trench. The dug-out where they and their instrument are installed is near the company commander's headquarters. A dug-out is seldom a haven of rest, and never of safety. The work of these men is not always of a stationary nature. They have to repair their wires when broken—often under heavy fire. When an advance is made by the troops they have to follow closely the unit to which they are attached, so as quickly to establish communication with the officer directing operations.

The war game inside and outside the dug-out goes on uninterruptedly till a time arrives when no answer can be obtained on the telephone.

"Wire's broken," ejaculates the operator.

Without a word two men, clutching up their rifles and tools, pass out into the white light of the German star-shells. More dangerous shells are falling with monotonous regularity to right and left of them as they go forward. To heed such happenings is worse than useless. At length they reach a shell-hole, the cause of their unwished-for promenade. The work of splicing a new piece of wire to the broken ends is soon accomplished. Then they retrace their steps to the dug-out.

Again! The British guns are blazing away at the Boches' front trenches. Suddenly the captain raises his eyes from his watch, and with a quick scramble is on the parapet.

"Over, boys!" he shouts. The men clamber out. As far as the eye can see to right and left there is a wrinkled wave of khaki-clad men surging forward.

The telephone operators, in accordance with orders, are waiting till their comrades have taken the hostile trench. They interpret these orders in the widest sense, for the attacking force can scarcely be said to have reached their objective before the three of them are doubling across. One carries a spool of wire which he unreels as he sprints along, the other carrying tools and the instrument.

Between their starting point and objective the German guns are putting a dense barrage through which they must pass. Shrapnel spatter on all sides like the first ominous drops of rain which precede a summer storm. Bullets, fired from the rear trenches of the enemy at the newly won position, "phit" past in countless numbers. Suddenly the man with the reel of wire spins half-round, staggers and falls.

"Only through the thigh. I'll follow on," he grinds out, as he hands his burden to a comrade.

The two gain the captured trench, where their captain awaits them.

Out of breath with his recent exertions, he pants out:

"Rig the telephone up here," pointing to a deep shell-hole. "Only place."

The two men quickly adjust their instruments, and the captain, after handing a written message to be sent through, hurries away.

The German guns are now playing on the newly won position, the heavy boom of high explosives intermingling with the snap-like report of the shrapnel shells. The captain perceives a mass of the enemy collecting for a counter-attack. He hurries to the telephone to notify the artillery of the target. A glance into the shell-hole shows that the shrapnel has taken toll—one of the operators is dead. The other is lying with the receiver to his ear, but he returns no answer to his superior's call. In a flash the captain realizes that that recumbent position is too natural to be natural. He gently takes the receiver from the stiffened hands and gets his message through. Then, glancing up, he sees a man on all-fours, looking down into the shell-hole. It is the wounded operator who has crawled painfully after his comrades.

"I'll carry on, sir," says the new-comer, quietly.

The American Association of Engineers will hold a national conventionl February 8, 9 and 10 in Chicago at the Hotel La Salle. Work of a promotional nature will constitute the greater part of the program which will be held under the slogan, "For the Good of the Engineer."

The Labyrinth

The Thread of Existing Laws Should Lead the Independents Out of the Maze

BY TERRY W. ALLEN

DURING the last month, Independent telephony has taken on a new aspect. The scales are falling from the eyes of the Independent operators, and they are beginning to realize that hope of negotiation with the Bell Telephone Company was a mere will-o'-the-wisp, something that could never be cause as it was continually eluding the grasp of those who pursued it.

The Bell Telephone Company, through its vice-presiden, N. C. Kingsbury, in one of the New York conferences held about a year ago told those of us who were attending the meeting that the Bell Telephone Company would not give us anything that it did not have to give us. I believe that a majority of those who attended the conference thought Mr. Kingsbury was joking; but I do not believe this is the case now. I think the Independent operators realize that their hope of gaining anything from the Bell Telephone Company lies in forcing it, and forcing it with the aid and assistance of the federal laws that we already have, which seem to my mind to be ample for the purpose.

For a number of months I have been trying to call to the attention of Independent operators the fact that we are common carriers, that we have a right to use the Bell Telephone Company's long distance lines, and that we have the law on our side.

But we have been in a labyrinth. Groping in its intricate passages, we have been lost for a time and did not know which way to turn or what path was the best to lead us out of the maze in which we found ourselves. All of this groping, all of this twisting and turning, trying to find some way to solve our problems, took time. While it did take time, I think it showed far more clearly and truly the ulterior hand of the Bell Telephone Company. If we had proceeded along a different line, if we had jumped in and made attack without due deliberation and thought, we would never have been shown the true motives, the unrelenting and cunning hand of the Bell; but these last two years have shown us clearly what it will do, and what it would do if it were given the power. The merger program which it carried on in defiance of its own word, of the government authorities and of all rules of propriety has left the Independent telephone operators in no uncertain mind as to the ultimate object it had in view, the crushing out of all Independent telephone plants in the United States. So clear and so well defined was this policy that now even the government's eyes have been opened. The Federal Trade Commission's investigation which is being made of the Western Electric Company matter has also opened that portion of the government's eyes to the tactics that the Bell Telephone Company and its allied powers have been using against our manufacturing industry.

But now we have caught hold of the silken thread that, if we will just have a little patience, will lead us out of the labyrinth and into our just and equitable rights.

You will remember in the old fable of the Minotaur how that dreadful and unconquerable beast lay in the center of the labyrinth and how it feasted upon the brave men who tried to slay and kill it. Confused and lost in the maze of the labyrinth's untrodden paths, they suddenly found themselves face to face with this dreadful creature; and once they were in its power, it lost no time in devouring them. The Minotaur can be likened to the Bell Telephone Company and the labyrinth to the maze into which it has tried to lead the government, the public, the Independent telephone operators and manufacturers. It has been successful in crushing out nearly every form of attack that has been waged against it; but the Minotaur was not invulnerable, and neither is the Bell Telephone Company.

The silken thread that I mentioned a moment ago is the laws of the country. If we hold on to these laws, if we demand an enforcement of these laws, if we bring all of these laws to bear upon the Bell Telephone Company, we can not only wound the Minotaur, but we can escape from the trap, the labyrinth, that he has set for us.

The Bell Company is going to present an exhaustive treatise upon government ownership to the Newland Committee. It does not want to call attention to local conditions if it can help it. It wants to call attention to foreign conditions, over which it knows the Newland's Committee has no control. The Independent operators of this country ought to present to the Newland Committee an intelligent statement of the case of Independent telephony.

I have never been a believer in knocking as a method of constructive building. I have always believed that knocking a competitor is to help him in his fight and I have tried only to present facts in connection with the Bell Telephone Company's acts in the things which I have written. I have tried only to say what I knew to be true and what I knew had a substantial basis. I do not believe that our protest to the Newland Committee against these tactics should be in the form of knocking the Bell Telephone Company alone, but we should show the Newland Committee and show them clearly that we have been kept out of a number of things to which we are, justly, honestly and intelligently entitled. We should show them why this has been the case and who was to blame. We should show them in no uncertain way that we need no new laws, but the laws we have strengthened in numerous instances.

I am absolutely against the repeal of any of the laws that we have at the present time. What I want to see is that these laws are made clearer and their operation made more intelligent and more constructive. We must have some of the passages in the Clayton Anti-Trust Act and laws of that character defined by Congress so there will be no misinterpretation of the purposes and intents of the laws. When this is done our position will be clear.

I cannot understand the idea of the Bell Telephone Company in bringing up European government ownership as a defence of its own position, for if it were allowed to run the telephone business as it would run it if it were not for Independent competition, the service would be in the class of the European government-owned-and-operated telephone companies. Right now it is getting ready to fight competition with another wad of money, which it always seems able to raise without difficulty. One hundred and twenty millions of dollars to be poured into this stock proposition only makes the

Independent telephone investments that much better for those who can invest in them.

The labyrinth is not a maze when once you have solved the puzzle. And so it is that the Bell Telephone Company is not the great "bug-bear" that we have been afraid of. The recent convention of Independent telephony marks a great step forward for that industry. With a little judicious advertising and a concerted effort on the part of Independent telephone operators, the problems will be solved and solved in the right way.

There is another *Transmitter* in the publication field—the third that we know of. This particular one is mimeographed to beat the printer, and is "For the employes, by the employes" of the Alberta Government Telephones. We promised our friends W. R. Pearce and A. M. Mitchell not to reproduce any of it this time—for which promise we are rather sorry when we see the good stuff in it. We hope to gain their permission to use some of it soon.

Bill Introduced by Lewis

Representative David J. Lewis, of Maryland, advocate of public ownership of all wire communications, December 13 introduced in the House a bill for the government purchase of the telephone system of Washington and for its operation as a part of the postal system. Two reasons for this proposal are cited by Mr. Lewis as follows:

First: Washington is the ideal place in which to test out the claims of the Postoffice Department that it can greatly cheapen and extend the telephone service.

Second: Experiments could be made for the development of the parcel post as a food-products conveyer from the rural producer to the city consumer. A low night rate between Washington and the farmers in Maryland and Virginia could be established, which would permit the city consumer to directly negotiate with the farmer for the shipment of food products by parcel post.

Of Interest to the Trade

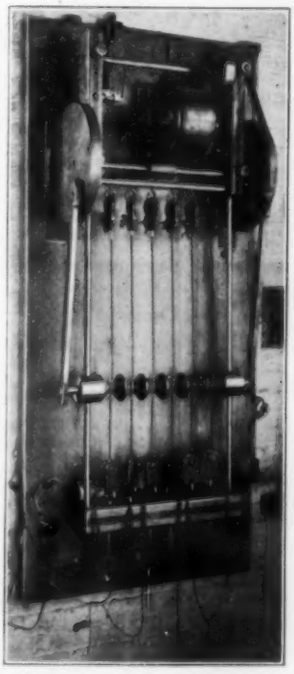
What the Telephone and Accessory Manufacturers Are Doing to Advance the Art

Testing of Its Cords by the Kellogg Company

Everyone knows to what severe wear telephone cords are subject, but the Kellogg Company, to assure offering the best in its cordage, has devised a machine for most rigidly testing cords for every conceivable kind of wear.

Switchboard cords are subject to considerable wear, for instance, due to the rubbing against the plug seat when making connections and disconnections. The Kellogg Switchboard & Supply Company has increased the life of its switchboard cords by using very durable material which it is said reduces this wear and tear to a minimum.

But to prevent any doubt as to the continuous quality of its cords it has built a special machine for testing the wearing qualities. This machine should prove as efficient as the one recently built and described, for testing enameled wire.



Cord Testing Machine.

This apparatus, illustrated, is automatically operated; the cords are attached to the hooks at the top and are wound once around the rod, made up with a series of conical surfaces, and then fastened at the bottom to weights, which prevent the cords from becoming slack. The sliding rod is operated up and down, which produce the severest wear possible due to the hard rubbing of the cords. A head receiver, connected with each cord, tells when, eventually the conductors begin to weaken.

The outcome of these tests, it is contended, prove that the Kellogg cords are unequalled for wearing qualities. Like all other Kellogg apparatus, only the best materials are used, and they are made up in the way that the result of nineteen years' experience has proven best.

The Kellogg cord department is said to be the largest of its kind, being equipped entirely with modern machinery.

Inter-Comm-Phone Apparatus

The unprecedented high cost of line construction and maintenance materials is causing telephone companies to spend more time on intensive development of territory now served with wire facilities than upon expansion into new fields of operation. The Stromberg-Carlson Telephone Manufacturing Company reports an increasingly large demand for its inter-communicating telephone equipment, which is sold under the trade name "Inter-Comm-Phones." These systems are designed for use in factories, business houses and residences, with connections to the telephone company's exchange. The class of service furnished is very attractive to the operating company as the rates earned are in higher proportion to the capital investment than for regular subscribers' station service.

The Stromberg-Carlson Company furnishes instruments, cables and accessories for these systems in 6, 12, 22 and 32 station sizes and three types of telephones, viz; wall, desk and combination types, as shown in the illustrations herewith. Each telephone is fitted with the same standard type apparatus used in regular subscriber's station equipment, except that the signaling between the local stations is of the battery call type employing d. c. vibrating ringers. The equipment of each telephone includes a three-position switching key with the required number of buttons for selecting and calling all other stations and the ex-

change. It is only necessary for the user of the telephone to press one button once to connect with the line wanted and to ring the desired station. The key buttons interlock by means of a tumbler plate and are restored to normal whenever any other button in the same key box is depressed. To answer a call one presses the home station key button and responds in the usual way. The system operates from two sets of dry cells, each set having a potential of from 9 to 15 volts, depending upon the size of the system. In buildings wired with alterating current bell-ringing transformer may be used in place of one set of dry cells for furnishing the ringing current.

Full metallic wiring between all stations are carried in waxed core cables made especially for this service. The cables are furnished in two types, viz: with painted braid or lead covering. The cables and apparatus are cross-talk proof and any number of connections up to the carrying capacity of the system can be established at the same time without interference through cross-talk, cross-ringing or other inductive effects. Complete instructions are furnished with each system which simplifies the work so that an electrician with no previous telephone experience can easily install the apparatus in proper working order.

The complete equipment for systems of this type as well as that required for systems having no exchange connections for private installations is illustrated and described in the Stromberg-Carlson Telephone Manufacturing Company's Bulletin No. 1017 which will be sent free upon application to the company's advertising department, Rochester, N. Y.

Kellogg at the Chicago Convention

During the big convention the four rooms at the "Sign of the Desk Stand" were filled to overflowing from 9 a. m. to 2 p. m. They were closed in the afternoons during the sessions.

The Kellogg instantaneous recall switchboard was demonstrated continuously for the benefit of interested visitors. A novelty of the display was a reproduction of a score of telegrams advising of the reliable, efficient

A Corner of Kellogg's Exhibit.

flexible and money-saving features of this economical switching apparatus.

The Kellogg Saver gains continuous audience these days, with batteries at about 25 cents each in barrel lots and no relief in sight. Many dropped into the Kellogg rooms to see the interest centering around the "Battery Saver," which only costs the price of one dry cell and before it wears out will save a score.

The New Kellogg No. 1 alternating current converter, which operates direct from the lighting circuit, also aroused much interest.

The Kellogg Company built and placed in its exhibit rooms several display panels which showed in their natural order all modern telephone instruments now in use by up-to-date and successful Independent companies.

In orderly succession they showed each type and modification, from the graphone to the standard wall sets and the telephone men were insured an instructive half hour in this one exhibit alone. Another handsome panel displayed all the Standard Kellogg pole changers. Scarcely anyone present could go over this series of instruments without learning at least one thing new.

Perhaps the most interesting and complete unit of display was the apparatus parts exhibit, in eight glass covered and especially illuminated cases. These were well worth careful study and will be mounted in permanent display racks at the Kellogg factory. These cases were designed by A. J. Carter, general sales manager, and the basic idea is to show the actual value of every part and material necessary in the service of the complete exchange.

To get a real, unbised opinion of anything it is often best to view it from a distance—to comprehend size and efficiency for instance. With this in mind the Kellogg Company exhibited a splendid new birdseye view of the plant—the factory behind the telephone.

Ghosts are creatures of fancy, but the Kellogg phantom circuit, No. 17A coil and connecting telephone was shown, plain as day, where the immeasurable value of this wonderful advance in telephone transmission was clearly demonstrated.

Another feature that attracted attention in the Kellogg display room was the assortment of magneto switchboard circuits which showed the entire apparatus layout in its correct position with all wiring colored exactly as the wires themselves are colored.

"Surprising as it may seem, many people do not know that the Kellogg Switchboard and Supply Company is, and for some time has been handling a very large supply business," said A. J. Carter, general sales manager, recently to a group of telephone men who had brought up the question of line construction materials.

"Our company is probably the largest exclusive telephone supply house in the field, and has undoubtedly the largest business in this phase of telephone work. This is true because of the Kellogg Company's unequalled facilities in the matter of buying and the expert handling of orders and prompt shipments.

"Our practical telephone men see to it that our customers get only the best grade of supplies, and the quickest way to prove the fallacy of 'all supply materials being alike in quality' is to put an inexperienced man on the job. There is a great deal of difference, for instance, in various kinds of galvanizing, likewise in the different kinds of wood pins, their manner of cutting and subsequent handling.

"It is not just a question of prompt shipments, for in the matter of speed the Kellogg Company has perhaps unequalled experience and facility, but the telephone man who, because of urgent line construction, or sudden storm, wants line construction mate-

rial at his station at the very earliest moment possible, knows that Kellogg, if anybody, can get it there.

"W. R. Brewer, who has charge of the supply department, makes it his particular business to follow up all orders, and when the very occasional error or delay happens, to have the case thoroughly investigated that the handling of the immense number of supply orders that come to the Kellogg Company every day will be continually improved and cared for in absolutely the most efficient manner."

Exhibits at the Convention

Addressograph Company, Chicago, several models of Addressograph for telephone companies. Two low-priced hand-operated models, for companies with subscribers' lists of 300 to 1,500. Motor-driven Addressographs for companies with larger lists, with attachments for printing addresses in duplicate, dates with address, skipping names, listing ledger sheets, etc. W. G. Fuller and S. S. Stevens in attendance.

American Electric Company, Chicago, represented by P. C. Burns, L. G. LeBourveau, M. K. Cook, W. T. Curtis, J. J. Speed, R. Lipsey, C. R. White, W. W. Kidney, Eugene L. Brown. New sanitary type switchboard with Burns express drop and jack and improved ringing and listening key, American simplified system, no wire except in key circuit. No. 60 receiver with electric welded magnet, cores on end of permanent magnet, Midget generators, Hi-lo Burns' bracket and porcelain mouthpieces.

Julius Andrae & Sons Company, Milwaukee, Andrae line of switchboards and supplies. M. H. Croswell.

Automatic Electric Company, Chicago, operating unit of automatic exchange equipment, 100-line unit in St. Paul-Minneapolis type, automatic system of handling long distance traffic, automatic enunciator system. H. A. Harris, H. D. Critchfield, W. F. Benoist, R. H. Burfeind, Roy Owens, T. C. Thompson, Seymour Hirsch, Frank Willand, L. A. Cutshell, N. P. Bartley, E. R. Neir, W. B. Evans, John Wicks, F. L. Baer, Michael Schwartz, J. E. Mooney.

The Barrett Company, preservative treatment of poles. K. C. Barth in attendance.

F. A. Bowdle, Decatur, Ill., Bowdle system of accounting for class A, B, C or D companies. Mr. Bowdle and H. A. Ball.

Chance Company, Centralia, Mo., Never Creep anchors, back truss, terminal brackets, lightning arresters. A. B. Chanser in attendance.

Coffey System & Audit Company, Indianapolis, Coffey System of accounting. J. W. Coffey.

Frank B. Cook Company, Chicago, telephone protective apparatus, supplies, and accessories, No. 5 multiple lightning arrester, S-19 pole cable terminal, fuses, sub-station protectors, distributing frames, lightning arresters, line equipment, Cook self-welding wire sleeves. Frank B. Cook, George R. Folds, J. F. Tompkins, F. A. Rader, J. M. Moore.

Cox Lightning Arrester Company, Eaton, Ohio, W. F. Cox.

Electrical Contract Company, Grinnell, Iowa, blueprints of telephone exchange and cable distribution plans. G. L. Saunders, Harold L. Beyer.

Electric Storage Battery Company, Philadelphia, chloride-accumulator batteries, batteries for lighting and ignition, testing instruments, hydrometers, thermometers, Exide submarine cell. W. L. Burroughs, J. T. Peyton, J. A. Fitts, H. M. Beck, G. H. Atkin.

Felt & Tarrant Manufacturing Company, Chicago, control key Comptometer adding and calculating machine. A. L. Jones, Miss Sadie Conroy.

French Battery & Carbon Company, dry cells, battery record for telephone companies. W. H. Conlin.

Fyr-Fyter Company, Dayton, Ohio, Fyr-Fyter fire extinguisher. W. A. Zebre.

Gund Manufacturing Company, La Crosse, Wis., clay models of D & T anchor in service, samples of anchors, clay model installation of a dead man. C. R. Pieper, Henry Gund, Jr.

Holtzer-Cabot Electric Company, Brookline, Mass., and Chicago, telephone parts and magneto equipment, Holtzer-Cabot pole changers, ringing equipment, four-frequency vibrating outfits, wireless telephone receivers, line signaling system, unit type battery charging outfits. C. I. Hickman, Robert Hall, S. E. Klunder, W. Calderwood.

Illinois Electric Company, Chicago, electrical supplies, construction tools, Pyrene fire extinguishers, complete line of the Fiber Conduit Company. W. W. Smythe, Jr., F. C. Smith.

Index Visible, Inc., New Haven, Conn., visible card filing devices. W. E. Burr, F. W. Holmes, L. S. Beard, W. C. Hamilton.

Indiana Steel & Wire Company, Muncie, Ind., Robert Miller.

Kellogg Switchboard & Supply Company, exhibit described elsewhere. J. B. Edwards, J. G. Kellogg, A. J. Carter, H. D. Currier, W. R. Hind, W. S. Boze, H. A. White, L. R. Foot, H. N. Faris, C. M. Bowling, B. A. Parsons, J. B. Haley, S. M. Lewis, E. F. Woodward, J. A. Stratton, Benjamin Woodberry, Claudie Prueitt, W. R. Brewer, Fred Seeley, B. H. Blake, J. A. Campbell, F. L. Eldridge, R. H. Coyne, C. M. Thompson, E. G. Lawrence, R. I. Utter, Stanley Duvall, D. J. Gillespie, M. E. Young, W. O. Collins, J. H. Hudson, Ralph Meyer, C. M. Freeman, C. W. Nelson, H. R. Dudley, O. F. Cassaday, C. D. Boyd, Edward I. Pratt.

Mathias Klein & Sons, Chicago, linemen's and electricians' tools, Klein pliers, wire grips, splicing clamps, wire stretchers, improved Haven's clamp for guy and messenger wire, Maine's feeder grip, climbers, wrenches, leather belts, safety straps, rubber gloves, Klein "staysalite" torch for soldering wire joints, new lever link used with standard splicing clamps. P. W. Herbst, J. M. Klein, Jr.

Leeds & Northrup Company, Philadelphia, Pa., electrical measuring instruments, type TS 5,300 portable test set, insulation testing outfit for street use, No. 5,420 direct reading fault finder. E. B. Estabrook.

Leich Electric Company, Genoa, Ill., power ringing machines, Leich ringing equipment operated from light circuits or battery, one-line and twelve-line ringing machines, magneto telephones and switchboards, Automaphone common battery telephones. O. M. Leich, A. J. Kohn, A. C. Reid, E. J. Myers, H. W. Hogue, T. J. Gullion.

MacGillis & Gibbs Company, Milwaukee, Northern white cedar poles. M. Sperry.

McMeen & Miller, Chicago, Leigh S. Keith, C. W. McKay, R. D. Perry, J. C. Bogle, K. B. Miller.

W. N. Matthews & Brother, St. Louis, new baby Woodpecker telefault, 8 in. by 3½ in. by 6 in., one cell, Matthews standard Woodpecker telefault, Matthews scrulix anchor, boltless guy clamps, two-bolt guy clamps, Matthews teleheight, cable splicing joints,

deadendeye, Spoovel digger. Claude L. Matthews, W. E. Bischoff.

Miami Trailer Company, Troy, Ohio, automobile trailer. W. F. Jolley.

Monarch Telephone Manufacturing Company, Fort Dodge, Iowa, Monarch universal convertible switchboard, common battery P. B. X. and intercommunicating apparatus, Monarch cordless P. B. X. board, small floor type P. B. X. board, 240-line Monarch desk type magneto switchboard, wall and desk sets, Monarch direct current selective system for magneto exchanges, wire chief's test unit. W. H. Trimm, L. Q. Trumbull, G. O. Wilson, R. O. Palmer, B. H. Merriman, Wm. F. Qualls, C. W. Snyder.

National Carbon Company, Cleveland, Ohio, Columbia batteries, samples of carbon products. C. W. Wilkins, L. Fischer, E. F. Meyers, J. C. Murray.

Neugle Pole & Tie Company, Chicago, sections of treated A1 Northern white cedar and Western red cedar poles. H. W. Mitchell, A. A. Marrs, J. B. Naugle, U. C. Zaenglein, L. E. Morier, W. G. Frostenson.

Nungesser Carbon & Battery Works, Cleveland, Ohio, Nungesser No. 6 "1900" telephone cell, Acme rapid fire ignition cell, composition metal automobile starter and lighter brushes. H. S. Greene, G. A. Briggs, Warner Jones.

Page & Hill Company, Minneapolis, Minn., L. L. Hill, E. C. Stockdale, Buford Adams, John H. Gale.

Reliable Electric Company, telephone, switchboard and cable plant protectors, renewable flat fuses, No. 101 main distributing frame with flat fuse in place of heat coil, wire splicing sleeves, Davidson cable hangers, baby-knife switches, test connectors. W. L. Cook, George W. Rodormer.

John A. Roebling's Sons Company, Chicago, samples of telephone wire and cable. A. B. Conover, W. H. Slingluff, P. A. Nelson, L. B. Dewey, L. B. Reid.

Standard Telephone Repair Company, Chicago, rebuilt magneto, desk and wall telephones, S-R automatic battery cut-outs and attachments, No. 10 Old Master dry cell. J. Skinderviken, F. S. LeSourd, J. L. Bick.

Standard Underground Cable Company, Pittsburgh, sample board of colonial copper clad steel wire, sections of wire bars and rods, samples of rubber covered telephone wire and telephone cable. E. J. Pietzcker, Elbert F. Norton, J. J. Hohmann, W. M. Rogers, Harold K. Weld.

Standard Underground Cable System, Chicago, terminal head method and splicing method from cable pothead to service wires. Leroy W. Stanton.

Stewart Brothers, Ottawa, Ill., testing apparatus, new portable Stewart detectometer for checking telephone, ringer coils, generators, receivers, transmitters, telephone cords, switchboard cords, repeating coils and locating bad joints, Midget Stewart test set, improved type "L" cable tester, wire chief's test cabinet, Stewart resistance meter, Stewart "Pocket 'Phone."

Stromberg-Carlson Manufacturing Company, Rochester, central energy multiple switchboard circuit panel, automatic ringing with instantaneous generator cut-off, automatic operator's cut-in and cut-off and flashing recall, subscriber station equipment for central energy, local battery and intercommunicating telephone systems, steel box telephones with semi-glossy black finish, iron-clad telephones and signaling sets for mines, fire and police systems, private branch exchange and magneto switchboards, panels of various pieces of apparatus. W. Roy McCanne, G. A. Scoville, E. A. Reinke, R. H. Manson, S. A. Beyland, G. Gislason, W. M. Angle, H. L. Harris, A. J. Roberts, A. M. Haubrich, J. B. Wilkinson, M. W. Redmond, J. T. Barrett, A. B. Crawford, R. Davis, M. D. Wood, F. C. King, E. G. Eidam, J. H. Levis, A. A. Cronk, E. G. Fehrenbach, F. H. Lincoln, C. A. Mahan, J. D. Milburn, A. M. Roberts, S. O. Vaughn, C. L. Ward, C. W. Shafer, L. E. LaFleur, H. J. Wilms, A. J. Johnson, F. K. Cannon, G. H. Crandall, E. L. Klingel, H. T. McCaig, E. F. McCord, P. D. Myers, E. P. Shafer, P. Winemiller, W. C. Freeman, E. A. Hanover, C. M. Slough.

Swedish-American Telephone Company, Chicago, magneto telephones and switchboard equipment, electrical toys and novelties. F. W. Pardee, F. J. Ruehlman.

Telephone Engineer, Chicago.

Telephony Publishing Company, Chicago.

Templeton, Kenly & Company, Chicago, Simplex No. 318 pole jack. W. B. Templeton, H. W. Finnell, A. C. Mills.

Thompson-Levering Company, Philadelphia, electrical measuring and testing instruments, new Thompson-Levering CI 320 artificial cable, standard 32-mile artificial cable, standard Peerless switch dial testing set, improved fault finder, government standard test set, Peerless plug type testing set, portable voltmeters and ammeters, small switchboard type volunteer and ammeter, insulation and capacity testing outfit. W. J. Thompson.

Torrey Cedar Company, Clintonville, Wis., T. R. Wall, Clintonville, J. A. Madel.

The Transmitter, Fort Worth, Texas.

Utilities Indemnity Exchange, St. Louis, Lynton T. Block, B. H. Batte, H. A. Hedding, Jr.

Warner Electric Company, Muncie, Ind., Warner standard and Peerless pole changers. Richard Stone.

Warner Manufacturing Company, Beloit, Wis., automobile trailer. J. W. Menhall.

The White Company, Cleveland, White two-ton winch truck with single drum winch and two niggerheads operated through special transmission. F. H. Williams, W. J. Sommers, C. E. Doling, S. G. Thompson.

Desk Type Switchboards

In small exchanges when it is necessary for switchboard attendants to do considerable writing and "book work," a desk type board of some kind becomes necessary. Meeting this condition to suit all users has been one of the most vexatious problems with which manufacturers have had to contend. The custom has been to furnish a flat top desk usually equipped with one pedestal of drawers. A turret or top was provided for the accommodation of the line circuit equipment with flush hinged key shelves for the cord circuit apparatus.

Such an equipment involves special work. When completed there is very little convenient writing space left, as the keys and plugs have usurped most of it, while the use of a typewriter or record books between calls in slack times is wholly out of the question.

The Kellogg Company considers that what is needed is a desk in addition to a switchboard, and that the old turret arrangement simply means going to great expense to ruin a desk for its intended use. The Kellogg solution of the matter is shown in the accom-

panying illustration. It shows a standard, low key-shelf switchboard attached to which is an ordinary desk or table arranged at right angles to the switchboard, while the operator sits in the corner thus formed, and has everything at her finger tips.

The convenience of this arrangement has to be tried out to be appreciated. The manufacturer contends that it is the ideal and proper arrangement for small exchanges or for a toll or chief operator's desk in medium-sized magneto exchanges where the chief operator can "boss things" and do book work at the same time, or when it is desired to switch the toll

A Convenient P. B. X. Desk.

lines to the local board after the morning rush is over and let the toll girl serve as a combined chief operator and accountant.

In general, whenever it is necessary for any switchboard attendant to do considerable clerical work, it is claimed that the purchase of a standard low key-shelf Kellogg switchboard and a plain, inexpensive table or desk, arranged in this manner, will afford a better and more satisfactory arrangement than will a desk and turret and key equipment. The Kellogg Switchboard & Supply Company, Chicago, will send folders describing this equipment on request.

Biennial Meeting of Electrical Committee

The biennial meeting of the Electrical Committee of the National Fire Protection Association will be held in March, 1917, in New York City, the day and place of the meeting to be announced later. As usual, the provisions of the National Electrical Code as they now exist will be considered, together with reports of all sub-committees.

Suggestions for amendments to the code, in order to be included in the bulletin, must be specific and where a change is desired in a rule or section of a rule definite wording for such change must be given together with the reasons why the change is recommended and these suggestions, together with all Committee Reports must be in the hands of the secretary not later than January 15, 1917.

As heretofore, the meeting will be open to all interested and such persons will not only be welcome but are urged to be present and give the committee the advantage of their experience and advice.

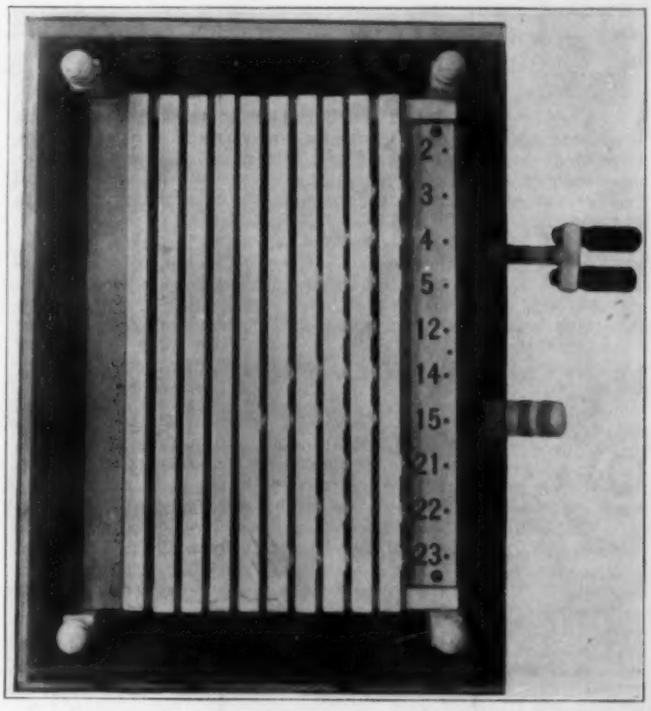
The Chicago Telephone Supply Company's folder on telephone "trouble insurance policies" is unique and, therefore, interesting. The company's location is Elkhart, Ind.

Novel Multi-Call Signal

THE accompanying illustration shows a multi-call central station, designed at Boston, Mass., to avoid losing so much time chasing up various people in a large establishment and the loss of actual money incidental thereto. With the multi-call to get the man one wants, it is only necessary to insert the plug under his number, then give the operating handle a slight twist. His signal number will sound on all the bells in the establishment, repeating it as many times as wished. It is provided with a single stroke bell, producing a strong clear signal and will operate at full efficiency from twelve to eighteen months with no attention whatever and can be renewed in fifteen minutes.

Instead of a battery the multi-relay is used whenever alternating or direct current at 110 volts is to be used as source of operating power, but the relay is not necessary when batteries are used for power. The old method of locating a person, by telephoning all over the plant for him, means that, many times a day, in every department, foremen are called from their duties, the study of important problems is interrupted, operations are held up, employes stand idle and a hundred persons are disturbed simply to locate one.

With the multi-call method, the man wanted is so informed in ten seconds and not another person in



Intercommunicating Multi-Call Signal.

the plant is disturbed. It is singular fact that, after the first few days, the signals sounded by the multi-call are noticed only by those persons subject to call. The wiring necessary for the installation of the multi-call system is of the simplest character and can be put up at small cost.

The Naugle Pole & Tie Company, with headquarters in Chicago, has opened a sales office in Minneapolis at 1038 Plymouth building. J. B. Naugle is district sales manager.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

NEWS FROM THE FIELD.

ALABAMA.

The Southern Bell Telephone and Telegraph Company of Birmingham will have one of the handsomest buildings it owns when the present work is completed, according to George Knox, manager. According to the manager, the new fire escape will be one of the best in the city. The two top floors will be turned over to the "welfare work," that department which takes care of the physical comforts of employes. On these floors will be the rest rooms, and dining-rooms and kitchen, just as they are now, only larger, and fitted more comfortably.

ARIZONA.

J. E. Allen and E. M. Luckie, owners of the Duncan telephone system, have arranged for the installation of a telephone line between Duncan and Steeplerock. Work on its installation commenced at an early date and the line will probably be in use the first week in January or thereabouts.

CALIFORNIA.

Fifteen thousand Los Angeles and Southern California employes of the Pacific Telephone and Telegraph Company had good reason to hang up their stockings this Christmas. They participated in the $6,000,000 holiday bonus that President Vail of the American Telephone and Telegraph Company announced in New York.

COLORADO.

Six thousand employes of the Mountain States Telephone and Telegraph Company, whose head office is in Denver, received $150,000 as their share of $36,000,000 Christmas bonus distributed to the workers of all of the companies in the associated Bell systems.

Should the Windsor town board grant the Mountain State Telephone and Telegraph Company a new franchise for 20 years, permitting the use of streets and alleys, it feels that the telephone people should give something in return, and will demand two per cent of the gross toll receipts of the Windsor exchange as compensation.

FLORIDA.

The special election to ratify the bill for long distance telephone lines in Jacksonville recently passed by the city council and approved by the mayor was held on December 17. In accordance with law, every ordinance granting this kind of rights has to be submitted to a vote of the people. The same kind of bill was submitted to the voters of Fort Lauderdale recently, after passage by their city council, and was carried unanimously. Miami, Florida, passed the ordinance through its council and mayor, and out of the entire vote cast on the question there were only three dissenting votes. This ordinance does not grant the right to do a local telephone business, and strictly prohibits the doing of anything except a long distance business. Ninety-eight percent of the work on the entire line from Jacksonville to Key West, 522 miles long, has already been completed. Long distance communication will be established from Jacksonville to Key West within twenty days after this bill is approved tomorrow. It will only be a short time now before a submarine cable will be laid from Key West to Cuba and the line extended to the Island.

GEORGIA.

The December meeting of the Atlanta Telephone and Telegraph society was held December 14, at 8 o'clock, in the assembly room of the Chamber of Commerce building. Edward Lyle, of the legal department of the Southern Bell Telephone Company, was the speaker of the evening.

ILLINOIS.

The telephone committee in Freeport, made up of Alderman Frank E. Miller, chairman, and Alderman B. F. Swingley and Fred E. Boedeker, reported that the committee had a conference with L. A. Herrick, manager of the local consolidated telephone lines, as to why one of the telephone systems has not been discontinued. Mr. Herrick informed the committee that the company had hoped to complete the change of the Bell telephone lines for rural patrons by January 1, but that it would take a longer period to make the change.

Efficiency in telephone operating and the uniformity of operating methods were the principal topics of discussion on December 12th at Bloomington, at the school of instruction, held in Jacoby hall for the switchboard operators who are employed by the Kinloch-Bloomington Telephone Company and the Independent Telephone Company. About one hundred were in attendance.

Lewistown telephone business has so increased in the last few weeks that the service of two more girls is required.

Consideration of two tentative measures embodying President Wilson's recommendations as to railroad legislation was begun on December 15 by the Senate committee on interstate commerce. The first of the measures is practically a wartime emergency bill and if passed will authorize the government to take over the railroad telephone and telegraph lines in case of military necessity. The second provides for compulsory arbitration of disputes between employers and employes.

E. C. Fish, manager of the Chebanse Telephone Company, who was recently fined $50 and costs for working an exchange operator over eight hours, has filed an appeal stating that the operator worked overtime without his knowledge or consent. Three operators are usually employed at the exchange but one had given up her position at the time and the other two slept at the exchange office on the night of September 16, but no calls were answered. On September 17 the operators changed shifts to allow one to attend the Kankakee fair.

The members of the Wabash County Mutual Telephone Company held a meeting in Mount Carmel on December 12 for the purpose of electing directors for the coming year. The old members were re-elected for the coming term as follows: I. R. Little, C. T. Riggs and U. G. Grundon.

The workmen who are installing the new switchboard in the new building of the Commercial Telephone Company, on Fifth street, Mt. Carmel, are making good progress. It will be ready to operate the first of the year.

The stockholders of the North Harwood telephone company met recently. Two new directors, Mike Sheehan and Wm. Jackson, were elected for a period of three years. The directors whose term of office had expired were Elza Griswold and Charles Arnold. An assessment of $10 per share was levied for the coming year.

INDIANA.

Solicitors, employes of the various departments and officers of the Central Union Telephone Company celebrated a business campaign in Terre Haute with a banquet and spirited discussion on December 15 in the Hoosier Nook at Hotel Deming. The gathering was arranged by the officers as an expression of appreciation for the extension work being done by the various forces in Terre Haute. The attendance of general officers added interest to the affair.

"The Citizens Independent Telephone Company of Terre Haute has the largest exchange with more stations in service than in any other city in Indiana, with the exception of Indianapolis," said Hart F. Farwell, president of the company, when speaking of telephones and the value of their service to the community. "The value of telephone service," emphasized Mr. Farwell, "depends upon the number of people talked to by subscribers. The more people reached the more valuable the service."

Modern, cozy and well lighted lounge rooms for girl employes, a kitchen for their noonday and night lunches, a basement garage, a $12,000 switch board, an automatic announcer for patrons awaiting long distance calls,—these are just some of the features of the Christian County Telephone Company's new home and office building on North Walnut street, Taylorville, Ind.

IOWA.

A gang of twenty-four men for the Iowa Telephone Company are working on the toll line between Villisca and Stanton. On December 14 they were two miles west of Villisca and the evening of December 15 reached that city in their work. The men are under E. E. Parker of Council Bluffs. They are going over the line from Council Bluffs to Corning.

Articles of incorporation of the Mt. Vernon Telephone Company of Clear Lake, organized at a value of $1,248, were filed at the county recorder's office. Most of the business of the company is carried on in Mt. Vernon township. The officers and directors of the company are: President, J. S. Anderson; vice-president, Frank Foster; secretary-treasurer, James Barlow;

board of directors, J. S. Anderson, Thomas Barlow, Claud Miller, Charles Harmes, Joe Miller, Frank Foster, John Isaacson.

The work on the telephone line at Carroll is still in progress but no service is promised for several days yet. The greater part of the poles are set and nearly all the wires are strung. The old telephone building and lot were sold at public auction, Saturday, December 9.

KANSAS.

When L. W. Kennedy, former cashier of the Missouri and Kansas Telephone Company, was arraigned in the city court on December 8, on a new warrant charging him with the embezzlement of about $4,000, he waived preliminary hearing. He will be tried at the January term of the Sedgwick county district court.

MICHIGAN.

Grand Rapids will be the first city in the world to reap the benefits of the new telephone call recorder which was invented by Charles E. Bedaux of that city. The Badaux recorder now is recognized as practical. The Citizens Telephone Company of Grand Rapids already has contracted for its use and recorders will be installed on Grand Rapids telephones before Spring. The recorder is an instrument which makes a clear record of all unanswered telephone calls. With one attached to his telephone a person may leave his house or office and returning find out just what telephones were used to call him during his absence.

V. R. Cummings of Ludington, Mich., has been appointed as manager of the Michigan State Telephone Company at Harbor Springs, filling the vacancy recently made by the departure of H. E. Hill.

To take care of the rapid growth of the northwest section of Detroit, the Michigan State Telephone Company started construction of a new building to be known as the Garfield exchange. This office is being erected on Grand River avenue just north of Chope place. The contract calls for completion of the work by August 1, 1917. About six months more will be required to install the switchboard and other equipment.

The annual meeting of the Holloway Telephone company was held in December and the following officers were elected for the coming year: President, L. H. McConnell; vice president, Edgar R. Rogers; secretary, Harry A. Smith; treasurer, Dr. J. W. Nixon; directors, Chas. L. Fowler, James Moore, Chester Westgate.

The Eaton County Telephone company elected the following officers: Richard H. Bohn, president; Lewis J. Dann, vice president; George Williams, secretary and manager; Cyrus Kilmer, treasurer.

MINNESOTA.

The Northwestern Telephone Exchange Company will spend $5,000,000 for new construction in 1917, says an announcement, signed by C. E. Yost, president, and W. B. T. Beltd, vice-president and general manager. Of this sum $2,850,000 is to be expended in the twin cities.

The company is to spend $600,000 in Duluth and about $1,500,000 in Minnesota and the two Dakotas outside of the twin cities and Duluth.

The telephone company on December 4 notified the district court at Mankato that it had completed the changes in some of its lines necessary to eliminate interference from the high tension lines of the Commonwealth Utilities Company, and had so completed the work on other lines as to eliminate the danger to its linemen from the power lines, and signified its willingness that the court should grant permission to the power company to turn on current for continuous service. The court thereupon granted such permission to the power company, and the towns south of Winnebago are now getting their twenty-four hour light and power service.

Private branch exchange operators, to the number of 350, December 12, in Minneapolis, turned their switchboards over to substitutes and gathered in Dayton's tea rooms for the second annual banquet given by the Tri-State Telephone Company.

The annual meeting of the stockholders and directors of the Red Wing Telephone Company was held this morning at the offices of the company in the Goodhue county bank building, and reports of the year's work presented for approval. The business was shown to be in a prosperous condition, at present 1,957 phones being in operation, which is a net increase of 101 phones over the last year's report. The following officers and directors were elected to serve for the coming year: D. M. Neill, president and treasurer; C. A. Rasmussen, vice president; N. H. Featherston, secretary; W. C. Krise, H. E. Akenson, A. G. Scherf, G. W. Stumpf, E. H. Moulton, W. S. Neill.

The Northwestern Telephone Company of Hudson is extending its line south of that village as far as the Afton line and also north of the village as far as the V. S. Culver farm. This will be a great convenience and benefit for the people in these rural districts to come in touch with the cities.

The central officers of the Shakopee Telephone Company moved into their new quarters on Holmes street. The fixtures are entirely new, the switchboard containing 479 numbers besides the farmer lines.

MASSACHUSETTS.

The American Telephone and Telegraph system continues to handle a record volume of business. Each month shows a big increase in gross, reflecting the splendid business year. In October the system reported total gross of $23,214,142. That is easily one of the largest, if not the largest, month's business in its history. The gain over the corresponding month of last year is $2,900,000, or 14 per cent. It follows a gain of $2,769,000 in September and $2,649,000 in August. In the first 10 months of this year the system did a gross business of $217,531,853, a gain of $23,793,513, or 12 per cent over the 10 months' period of last year. This indicates that gross for the year will show an increase of rising $29,000,000, or more than in the entire 1915 and 1914 years combined. In 1915 the gain was $13,957,000 and in 1914, $10,379,000. In the 10 months' exchange service gross increased $15,807,000, while toll revenues expanded $7,624,000.

MISSOURI.

Springfield officials of the Missouri and Kansas Telephone Company say that, owing to the difficulty in getting deliveries of copper wire, due to the demand for copper for war purposes, they are unable to accommodate prospective subscribers with new telephones. Only where persons on straight lines consent to being put on a party line temporarily is the company able to increase the number of its subscribers.

Howard L. Snider, secretary and general manager of the Kansas City Home Telephone Company, resigned on December 11, effective on January 1.

MONTANA.

An organization to be known as the Hinsdale, Genevieve and Thoeny Rural Telephone Company has been formed for the purpose of connecting the towns mentioned with a telephone line. The officers are: Walter Frazier, president; C. H. Rutherford, vice-president, and John C. McColly, secretary-treasurer. Thirty-six residents of the district embraced have agreed to pay $75 each on the cost of installing the new telephone system. William C. Conway is promoting the new company.

NEBRASKA.

The telephone company announced today that the contract had been let for the steel for the new fifteen-story building at Nineteenth and Douglas streets to the Omaha Structural Steel Co. for 2,000 tons. Ground will be broken shortly after January 1 and the building rushed to completion as rapidly as possible. The building, announced as fifteen stories high, will be higher, as some of the stories will be deeper than the average because of the telephone plant equipment.

NEW MEXICO.

The Citizens Light, Power and Telephone Company, recently organized and representing Denver capital has purchased the Gallup Electric Light Company, the Peoples' Light and Power Company and the Gallup Telephone Company.

NORTH CAROLINA.

The office of District Manager James Northey, of the Southern Bell Telephone & Telegraph Company in Charlotte has moved up town and is located at No. 9 South Tryon street, where the company has maintained a pay station for some time.

NORTH DAKOTA.

Construction of a 30 by 26-foot addition, at the rear of the newly completed Northwestern Telephone Company building, and running the full height of the new building, is believed to predicate the establishment by the company in Fargo of more extensive interests than are now maintained here.

NEW YORK.

The members of the enigneering department of the American Telephone and Telegraph Company held a private dinner on Friday, December 15, in the ballroom of the Hotel Astor, Manhattan. President Theodore N. Vail of the American Telephone and Telegraph Company was the guest of honor. Among the 400 diners from all over the United States who have been in New York for the past week attending a conference on the engineering problems of the company were R. H. Boggs, R. H. Burcher, J. H. Colket, R. F. Esterbrook, E. B. Fairman, F. J. Holmes, J. Langford, W. D. Sargent, A. C. Thomas, H. F. Thurber, E. F. Watson, G. E. Bassett, C. K. Bridges, S. B. Rhodes, E. J. Stone, H. G. White, H. D. Dixon and A. W. Drake.

As a result of substantial oversubscription, allotments of the new issue of $80,000,000 American Telephone and Telegraph Company 5 per cent collateral bonds have been cut down by J. P. Morgan & Co., syndicate managers. Separate applications

for $1,000 bonds or less have been granted in full; individual subscriptions running from $1,000 to $10,000 get 30 per cent of the amount asked for, with a minimum of $1,000; and subscriptions above $10,000 will get 20 per cent, with a minmum of $3,000. Where a total allotment of $10,660 or more to a subscriber contains a fraction of a part of $1,000 the fraction will be eliminated.

OHIO.

Delphos is facing a telephone war. Because of an increase in rates, it is estimated that more than 300 of the 1,100 subscribers in that city have discontinued the service since the first of November. Last January the Delphos Home Telephone Company, in announcing the construction of a new office building, and the installation of improved and modern service, stated that it would be necessary to increase the rates November 1, 1916. Service on party lines was to be increased from $1 to $1.25; single lines from $1.25 to $1.50, and business telephones from $2 to $2.75.

Albert E. Davis, assistant equipment superintendent of the Lima Telephone and Telegraph Company, has ben appointed manager of the Delphos Home Telephone Company. His appointment will be effective January 1. He succeeds A. C. Almy, who resigned some time ago because of differences with the management.

For the purpose of discussing topics calculated to advance efficiency and services, 52 telephone operators, representing the ten companies comprising the Tri-County Telephone Association, held an all-day meeting at Eaton. Preble, Montgomery and Miami counties are included in the district.

Indications are that telephone rates in Columbus and Ohio will be increased from 10 to 25 per cent within the next few months. The cost of everything used in the telephone service has increased from 25 to 700 per cent during the last 12 months.

Practical telephony is the newest addition to the Cleveland night school courses of East Technical school, East 55th street and Scovill avenue S. E. Instruction is given in installing, repairing and maintaining telephones. Elementary electricity and magnetism are taught and switch boards are built. The course, covering twenty weeks, is given by H. A. Hutchins, assistant principal of the school. The Cleveland Telephone Company is co-operating by furnishing the apparatus used and by assisting in the preparation of the lectures. The course is designed to enable men to go directly into this branch of telephone work.

An automatic telephone system is to be installed at Marion at an expenditure of from $150,000 to $170,000. The new plant is expected to be in operation by May 1.

The Galion Telephone Company has agreed to purchase the plant of the Bell Telephone Company in that city and consolidate the two exchanges. The price is to be paid in stock, the market value of which is $47,373, and the Bell people also are to purchase additional stock at the price of $12,000. Authority to complete the trade has been asked of the commission.

S. H. Kitchen severed his connection with the Middletown Telephone Company, of which he has been the efficient manager for some years, and is now in the office of the Nein Brothers Realty Company.

February 10 will mark the passing of the two telepehone systems in Marietta. The result of agitation a year or two ago by civic and business associations in Marietta is to be realized and Marietta people are to have one comprehensive telephone system reaching all telephone users. It was the suggestion which came from the business men here that prompted the whole project. A full announcement of the plans for the consolidation was made by Agent C. Collins of the Central District Telephone Company, who is just beginning a canvass of his subscribers as well as those of the Washington Company and expects to complete it rapidly. The work of installing the new telephones will be begun at once, so that there will be no avoidable delay in establishing Marietta's single system and that February 10 will find the combined system in service.

The annual meeting of the stockholders of the Wayne County Telephone Company will be held on Monday, January 8th, in the Rex theater, Wooster, Ohio. The session is to begin about 1 o'clock. No business of special importance is to be transacted, according to statements made on Saturday. New directors are to be chosen and the meeting will be open for a discussion of various matters. The year is to be reported as a successful one, quite a number of new telephones having been installed. Between 1,700 and 1,800 are said to be in operation.

OKLAHOMA.

A representative of the Pioneer Telephone Company was in Bristow inquiring of business men and subscribers generally whether they wanted a new and better telephone system. The plant now in operation is of old and obsolete kind, where one has to ring "central." The new system that may be installed is the central energy system. The representative claims that it will cost $30,000 to install the new system and that it will take from nine months to a year to get it installed. There will not be an old telephone taken out until the new plant is fully installed. There are 400 telephones in Bristow.

PENNSYLVANIA.

The Bell Telephone Company of Pennsylvania cut into service at Mechanicsburg, the new common battery telephone exchange and from now on subscribers of the Bell Company in that community will receive telephone service from the same kind of equipment as is used in Harrisburg. Installation of the new exchange was started several months ago and is located on the second floor of the Mechanicsburg National Bank Building. The new equipment consists of No. 10 three-position switchboard equipped to take care of the present 401 stations and to provide sufficient facilities to care for the increase in business. The board is so arranged that additional sections may be added with comparative ease.

Harrisburg is now one of more than a hundred cities of the United States with automatic telephone service in operation. The Cumberland Valley Telephone Company of Pennsylvania, Federal square, "cut over" its plant from the old manual system to the new automatic in the presence of the company officials and a number of representative citizens on December 9.

SOUTH DAKOTA.

Three new telephone companies with Gedes as their central point were incorporated, the list being the Marmon Telephone Company, with a capital of $500; incorporators, Oscar Halgerson, William Timms, Soron Larson; the Goose Lake Telephone Company, capital $1,000; incorporators, F. F. Ruble, Ben McGinnis, Will Sanders; the Moore Township Telephone Company, capital $1,000; incorporators, Fred Kaiz, Joseph Houska, Joseph Tucek.

TENNESSEE.

The seventeenth regular meeting of the Telephone society of Nashville was held at the Maxwell House at 8 o'clock on the evening of Tuesday, December 19.

INCORPORATIONS

The Upper Willamette Mutual Telephone Company was incorporated December 15 in Oregon for $500 by H. C. Wheeler, G. F. Hurd, E. G. Swift, W. E. Stroud, A. T. Miller and George Warner, at Pleasant Hill, Oregon.

A charter was granted December 15 at Nashville, Tennessee, to the Gross-Lane Telephone Company, Lafayette; capital stock, $1,000; incorporators, W. P. Simmons, W. J. Simmons, W. P. Morrison, T. G. Summers and L. B. Carr. To take over the lines of the Lane Home Telephone Company in Macon county.

The Ashtabula Telephone Service Company, Ashtabula, Ohio, raised its capital stock from $10,000 to $500,000 December 15.

The Macon Telephone Company of Macon, Illinois, has been incorporated with a capital stock of $12,500. The incorporators are E. S. Sterrett, C. B. Cheadle and B. N. Boynton.

A charter was issued to the Belle Painte Telephone Company of Ballentine, South Carolina, on December 12, with a capital of $500, the officers being S. M. Busby, president; J. P. Gains, vice-president; A. B. Daily, secretary and treasurer.

Three new telephone companies with Geddes as their central point were incorporated December 13 in South Dakota, the list being the Harmon Telephone Company, with a capital of $500, incorporators Oscar Halgerson, William Timme, Soren Larson; The Goose Lake Telephone Company, capital $1,000, incorporators F. F. Ruble, Ben McGinnis, Will Sanders; The Moore Township Telephone Company, capital $50,000, incorporators Fred Keiz, Joseph Bouska, Joseph Tueek.

The Sound Telephone & Telegraph Company of Tacoma, Washington, has been incorporated with a capital stock of $10,000. The incorporators are A. Ohlson, M. Ohlson and W. J. King.

The Peoples Telephone Company has been incorporated at Lemmon, South Dakota, with a capital stock of $10,000. The directors and incorporators are Will Storm, president, Thunder Hawk; J. E. Lorins, treasurer, Thunder Hawk; F. Umback, secretary, Lemmon, and L. D. Winney, Lemmon.

The Ellis River Telephone Company, Ellis River, Maine, has been incorporated with a capital stock of $10,000. The officers and incorporators are L. J. Thurston, president, Andover; F. E. Leslie, treasurer, Auburn.